ON

TWO SUBFOSSIL WHALES

DISCOVERED IN SWEDEN.

BY

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WITH 11 PLATES.

UPSALA,
W. SCHULTZ. 1867.

Our knowledge of the Whalebone Whales, the largest of all mammals, has hitherto been, and still is, very imperfect, notwithstanding the publication in later times of several treatises on that subject, which possess great merit, and materially contribute to dissipate the darkness, that has hitherto enveloped that portion of zoological science. Later observations have shown, that the number of species comprised in that group is by no means so small as had been supposed, as also that those, which occur in the Southern or Antarctic, are always different from those, which belong to the Northern Ocean. Since it was proved by the late Professor ESCHRICHT that they make periodical migrations, it has been evident, that several species, that pass the milder season of the year in the North Polar seas, emigrate to the south in the colder season, and are occasionally met with in waters far south of their natural zone, e. g. *Physalus musculus* COMPANYO, or *Phys. antiquorum* GRAY in the Mediterranean; but, as far as we are aware, they never extend their wanderings to the equatorial-regions, nor do those which belong to the Southern ocean ever enter the waters north of the equator. It is however evident, that, in consequence of this, the geographical distribution of the species is very extensive. On this subject much yet remains to be investigated, and it is possible that closer examination and comparison may show differences between species that have been hitherto considered as identical.

As this distribution appears to be dependent on temperature, for some species belong to the polar and others to the warmer seas, it is evident that under the different relations of temperature that prevailed in ancient ages, the distribution must have been different from what it is at the present time.

During a colder period e. g. the Northern Whale (*Balaena mysticetus*) has visited our Scandinavian seas, and during a milder period these waters have doubtless been the resort of more southern species. The time, at which one of the species we have at present under review (*Eschrichtius robustus*), visited our seas, seems not to have been very distant, and the character of the shells, found in the neighbourhood of the bones, shows that the surrounding water was then such as it is now. We have unfortunately not been able to examine the earth strata at the spot where the other species (*Hunterius Svedenborgii*) was found, but the epoch, at which the bones were there imbedded, is without question far more ancient; and the structure of the skeleton indicates a nearer relationship with those species, which now belong to the milder seas, and one would accordingly seem justified in assuming that the bones were imbedded when the temperature was higher than when the Northern Whale (*Balaena mysticetus*) was found here, that is to say, not under the so called Ice-period. We may probably attribute it to the period, when the European Marsh-Tortoise (*Emys Europaea fossilis*) was met with here at least as far north as East Gothland.

Among the contributions to a more accurate knowledge of the Whalebone Whales that have been made in later times, we would signalize the following works: "Catalogue of Seals and Whales in British Museum" by J. E. GRAY; "Om Nordhvalen (*Balaena mysticetus* L.)", by D. F. ESCHRICHT and J. REINHARDT in the Royal Danish "Videnskabs-Selskabs" Transactions 5th Series Natural and Mathemat. sciences, 5th Vol.; and "Notes on the skeletons of Whales in the principal Museums of Holland and Belgium, with descriptions of two species apparently new to science", by W. H. FLOWER, in the Proceedings of the Zoological Society of London, 1864. Also a work small in extent but remarkable for accuracy and fullness of detail: "On a Whale of the Genus *Physalus* GRAY, captured in Orkney", by ROBERT HEDDLE, in the Proceedings of the Zoological Society 1856, as also "Beskrifvelse af en ved Lofoten indbjærget Rörhval, *Balaenoptera musculus*", by G. O. SARS, in the Norwegian "Videnskabs Selskabets Forhandlinger" for 1865.

In the first-named very valuable work of Prof. J. E. GRAY (Catalogue of Seals and Whales &c.), based upon the rich materials afforded by the museums of England, France, Holland and Belgium, and a thorough knowledge of all the litterature pertaining to the subject, it has been conclusively proved, that this group of the Animal kingdom's giants is by no means so destitute of resource of different "forms" or species, as had been previously for the most part supposed, and that the study of the diffe-

rences requires greater critical accuracy than it has been hitherto usual to bring to the subject, as also that the distinguishing characteristics require the setting up of a greater number of generic groups and even families. The Wahlebone Whales are divided into 2 families: *Balaenidae*, without and *Balaenopteridae*, with dorsal fin. Under the first of these families are classed 5 or 6 and under the last 8 genera. Ten different species are considered as belonging to the former, of which however one (*Balaena gibbosa*, Erxl.) is very uncertain, and one (*Palaeocetus Sedgwickii*, Seeby) only is found as a fossil; and to the latter family belong 24 different species, some of which appear however tobe uncertain, and therefore have been classed as such. We may in the mean time look upon it as certain, that the number of known species will much increase in proportion as our knowledge of the whales found in the North Pacific and Antarctic Oceans approaches perfection. In the above-named work of Gray the greatest part of the characteristics are derived from the skeleton, as being the part which is most easily accessible for the Museums, and can thus be most frequently made the object of a naturalists study, and which indeed doubtless affords the best marks of distinction. Nevertheless, as far as our present knowledge extends, variations in the structure of the skeleton are always accompanied by variations in the external form of the body, which shows that also these latter peculiarities are deserving of attention, and that it is requisite, in order to gain a full and certain diagnosis of the different species, to possess a knowlege not only of the animal's skeleton but also of the form of the body. Sometimes in the absence of better indications good characteristics have been derived from the whiskers, as for example, in the case of the *Balaena marginata*, Gray. As Prof. Gray in this work has not only set forth the results of his own extensive observations of Cetacea in general, but has also collected and arranged whatever is new and important in the communications of others, he has made this "Catalogue" a general synopsis of that whole order of Mammals, in the study of which the work thus becomes an indispensable standard.

The treatise on the Northern Whale published by the late Prof. Eschricht and Prof. J. Reinhardt has the merit of being the most minute and elaborated monography on the subject of any special kind Whalebone Whale that we possess, and accordingly offers, while fully going into the natural history of that Whale, a worthey example and good guide for anyone who may wish to give out a monography of any other kind of Whale. The first of these gentlemen had the intention of publishing a detailed description of the Nordcaper or Biscayo-Whale, but before he could carry

this intention into effect, his indefatigable scientific activity was for ever interrupted by his untimely death, to the great loss both of his science and his friends. It is to be regretted that the work he had planned has not, since Prof. ESCHRICHTS' death, been completed by his worthy colleague in the treatise on the Northern Whale.

Dr. W. H. FLOWER'S treatise on the whale-skeletons in the Dutch and Belgic Museums, while evidencing the comparative anatomists experienced eye and accurate perception of characteristic distinctions, has the merit of making us better acquainted with the interesting whale-skeletons preserved in the two countries above named, which offer types of new genera and new species. It contains also some valuable remarks on the importance of the osteological characteristics, with respect both to individual variations and those which are the result of age.

Before proceeding to a description of the bones of the two whales that form the subject of this essay, we will give a short account of the as yet known genera belonging to the suborder of the Whalebone Whales, in order to show in what relation the genera, to which the specimens in question belong, stand to the other. In this we consider that we ought chiefly to follow the arrangement adopted by Prof. GRAY in the above mentioned work, with the exclusion of a few genera, which seem to us to rest partly on very slender partly on insufficient characteristics.

Mysticete, Gray, or Whalebone Whales.

Dorsal fin	Families:
present	1. Balaenopteridae, Gray.
absent	2. Balaenidae, Gray.

				Genera:
Balaenopteridae. Bladebone with processus coracoideus and acromion	complete and large. Processus coronoideus	high and distinct. 1st pair of ribs at upper end.	undivided. Number of vertebrae: 60 or more	1. Physalus, Gray.
			50 or less	2. Balaenoptera, Lacép.
			cloven or biceps. Of the cervical vertebrae: only epistropheus with annular lateral processes	3. Flowerius, n. gen.
			epistropheus and nearest adjacent with annular lateral processes	4. Sibbaldius, Gray.
		low, forming merely a tubercle		5. Eschrichtius, Gray.
	rudimentary or none			6. Megaptera, Gray.

Genera:

Balaenidae. First pair of ribs have the upper end
- undivided Bladebone
  - with processus coracoideus. . . . . 1. Balaena, Linné.
  - without proc. coracoideus. Acromion
    - perfect. . . . . 2. Eubalaena, Gray.
    - rudimentary . . . . 3. Caperea, Gray.
- cloven or biceps' . . . . . 4. Hunterius, Gray.

MYSTICETE. J. GRAY.
(Whalebone Whales).

1. Family. *Balaenopteridae.* J. GRAY.

Provided with dorsal-fin. Fore part of the under side of the body longitudinally grooved. Whiskers short, broad and twisted, &c.

5. Genus PHYSALUS. J. GRAY.

Body particularly slender and elongated, with somewhat small pectoral fins, and the dorsal fin, which is likewise small, situated just in front of posterior quarter of the animals length. Processus coracoideus and acromion strongly developed; processus coronoideus high; 1st *pair of ribs have upper end single and undivided. Number of vertebrae* 60 *or more; all the cervical vertebrae separate; atlas with lateral processes situated above the middle of the sides, and of a conical form. Epistropheus and some of the succeeding cervical vertebrae, in older subjects, with annular lateral processes. Number of ribs* 14—16 *pairs.*

In this genus GRAY reckons 9 species from Europe, Asia, Africa, New Zealand, and North and South-America, namely: *Phys. antiquorum* Gray, *Ph. Duguidii* Gray, *Ph. patachonicus* (Burmeister), *Ph.? australis*, Gray, *Ph. brasiliensis* Gray, *Ph.? fasciatus* Gray, *Ph. indicus* (Blyth), *Ph.? Iwasi* Gray, and *Ph. antarcticus* Gray, of which however the six last are very imperfectly known, and some of them, as the notes of interrogation indicate, cannot even with certainty be affirmed to belong to this genus. We also consider that two species, referred by GRAY to other genera, ought to be classed under this. *Benedenia Knoxii* Gray, which, according to the opinion first put forth by GRAY himself (in Catal. of Osteol. Specim.

142) and also according to what FLOWER has shown in the above cited work, is without question a very young *Physalus antiquorum* (*musculus*), or at least a species of the same genus. The description given by G. O. SARS, in his above mentioned paper, of the young *Physalus antiquorum* taken at Lofoten in Norway, exhibits the closest agreement with the *Benedenia* in the form of the cervical vertebrae. The upper end of the first rib shows some difference in form, the capitular process being somewhat more extended in the *Benedenia*. The lesser inflected and in front more tapering form, displayed by the under jaw of the *Benedenia*, is evidently a result of its imperfectly developed state. We are moreover of opinion that the *Cuvierius Sibbaldii* Gray, or *Physalus latirostris* Flower belongs to the genus *Physalus*, as it corresponds with that genus in the large number of its vertebrae and ribs, and offers no other differences of form, than that the snout of the cranium, the nasal-bones, and lower jaw-bones are broader than those of the *Physalus antiquorum*. According to this view Europe's Fauna has only 3 species of the genus *Physalus*, viz. *Phys. antiquorum* Gray, *Ph. Duguidii* Gray, and *Ph. Sibbaldii* Gray, of which however the second cannot as yet be considered as fully established, its claim resting on the form of the cervical vertebrae, which is subject to considerable modifications during the growth of the animal. The *Balaenoptera Carolinae* shortly noticed by A. MALM [1]) is a *Physalus*, which, though 55′ long, is as yet but imperfectly developed, and the skeleton of which in every particular, e. g. in the imperfect lateral processes of the cervical vertebrae, in the slender form of all the bones (even the phalanges) and in the loose junction of the epiphyses with their respective bones, clearly indicates a young individual. According to the, it must be owned, somewhat imperfect examination we were enabled to make of it during its exhibition last summer in Stockholm, we look upon it as a young *Physalus antiquorum* GRAY or *Balaenoptera musculus* L. COMPANYO. It has indeed one caudal vertebra more (26) than is usually the case, accordingly 63 vertebrae in all, but that number is given by ESCHRICHT and REINHARDT for a *Balaenoptera musculus* in their work on the Northern Whale [2]), probably from a young specimen from Greenland, preserved in the Anatomical Museum at Copenhagen. With that specimen the *Bal. Carolinae* also closely agrees in the form of the sternum. That bone however in the *Phys. antiquorum*, as also in the *Megaptera boops* and

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[1]) Några blad om Hvaldjur i allmänhet och *Balaenoptera Carolinae* isynnerhet. Göteborg. 1866.

[2]) p. 549.

others, is of so changeable a form, that much stress is not to be laid on this circumstance. In the general structure of the skeleton the *B. Carolinae* seems perfectly to agree with a young specimen of the *Physalus antiquorum*, the skeleton and stuffed skin of which are to be seen in the "jardin des Plantes" at Paris, in the neighbourhood of the building for the Museum of comparative Anatomy, although that skeleton is that of a somewhat smaller individual, (14 mètres long), with only 62 vertebrae and 14 pairs of ribs, (the first pair being probably lost). The agreement between them in the form of the lateral processes of the cervical vertebrae is complete. As in the case of the *B. Carolinae*, according to our own observation, the epistrophaeus has the lateral process on one side, viz. the right, closed or annular, and on the other open. In this as well as in the form of the phalanges great similitude prevails between *B. Carolinae* and the specimen of *Balaenopt. musculus* described by G. O. Sars in the above mentioned treatise. In this latter specimen it is true that both lateral processes of the epistrophaeus were still open, but the drawing pl. 3. fig. 5 shows, that that of the right side was more nearly to be closed than that on the left. We may therefore assume, that, in the developement of the lateral processes of the epistrophaeus in tis species, it is normal that the right-hand process first assumes the annular form. As regards the external form of the body, the *B. Carolinae*, if we can rely upon the figure given by Malm on the cover of the brochure referred to, presents some differences from the usual type as set forth in the drawings of Schlegel, G. O. Sars and others, the snout being obtuser, and the portion where the nostrils are situated projecting pretty abruptly, or forming a kind of hump instead of a hollow, as it is usually represented. Between Sars' and Malm's specimens there is however this correspondence, according to Malm's photograph, that there is a keel stretching along the upper side of the head. G. O. Sars [1]) states that the fishermen on Norway's western coast characterize by the appellation of "Tuehval" a particular species of Finner, which is distinguished from others by a large knotformed protuberance (Tue, hill, or Hus, house) at the blowholes, and identifies it with Ström's Tuehval, and says, that according to the observations of the fishermen its in- and ex-spirations produce a peculiar dull sound, which seems to give some support to the assumption of this protuberance being a distinctive mark of the *Bal. Carolinae;* but in the first place the aforesaid figure, given by Malm, has in all probability been drawn from the Whale when already stuffed, for the photo-

[1]) Ibid. p. 24.

graphs of the animal, sold at the exhibition, seem to indicate a less marked protuberance at the nostrils, and a more pointed snout, and secondly it should be remembered that R. HEDDLE in his "Notes on the Nybster Whale"[1]) remarks, that he had the opportunity to observe on another individual apparently of the same species (*Physalus antiquorum* Gray), that the place of the nostrils was sometimes flat and at other times boldly projecting. ("The blowholes were at times flat and unprojecting, at other times boldly protuberant, the animal evidently having the power of raising or depressing these organs"). This observation goes greatly to diminish the value of this protuberance as a characteristic, which moreover was probably something smaller in reality than it has been represented in the figure referred to. One circumstance which however requires notice is, that although it is about 55′ long, the structure of the bones indicates that it is as yet far from full-grown, whereas the skeleton of the *Physalus antiquorum* at Bergen, as well as the skeleton, also of a male, preserved in the Zool. Riksmuseum at Stockholm, which is about 58′ long, (the length of the entire animal would therefore be 60′—62′) has all the characteristics of an old full-grown individual. The larger size of the *Bal. Carolinae* in proportion to its age is a circumstance that receives additional weight from the statement of G. O. SARS, that the fishermen relate, that the "Tuehval" is larger than theother Finners met with in that tract, as also from that of HEDDLE, who says (ibid.) that the individual, in which he had remarked the power of raising or lowering the nostrils, was "a very large Finner." As the newspapers inform us that we soon expect from MALM a detailed description of the *B. Carolinae*, we may hope before long to be in possession of fixed points whereon to found a judgement as tho whether it be or be not a separate species.

2. Genus BALAENOPTERA, LACÉPÈDE.

Form of the body less elongated than in the preceeding genus. Pectoral fin of moderate lenght, and dorsal fin tolerably high and situated at the beginning of the posterior third of the animals length. Processus coracoideus and acromion strongly developed, and processus coronoideus high. First pair of ribs single and undivided at the upper end. Number of vertebrae 50 *or less. Cervical vertebrae ordinarily free, but sometimes the* 2nd *and* 3rd, *and occasionally the* 3rd *and* 4th *are united at the arcus. The atlas has the lateral processes situated about the middle of the sides. They are usually annular only*

[1]) Proceed. of the Zoolog. Soc. of London. 1856. pag. 197.

on the epistrophaeus, but sometimes also on the 5th *and* 6th, *occasionally only on one side of the* 6th. *Number of ribs* 11—12 *pairs. Whiskers white.*

Of this genus only one species is with certainty known, viz. *Balaenopt. rostrata* (O. Fabricius) J. Gray, which offers two varieties: *Pterobalaena minor*, variet. *groenlandica et bergensis*, D. F. Eschricht, the one obtained from the North-Eastern coast of N. America, the other from the western and northern coasts of Europe. J. Gray [1]) from some fragments of the skeleton has with some uncertainty adopted a 2nd species, under the name of *Balaenopt. Swinhoei.* It is from the sea in the neighbourhood of Formosa, but our knowledge of it is as yet so imperfect that it is no possible to decide with certainty whether it ought really to be classed under this genus. Professor H. C. L. Barkow [2]) has described a smaller skeleton of a young Whalebone Whale, preserved in the University-museum at Breslau, which, though in other respects appearing to correspond with the *Balaenoptera rostrata*, differs remarkably from that species in the structure of the anterior extremities, on which a thumb with one phalanx are said to be plainly visible; but Barkow has himself declared, that it is by no means certain, that the extremities thus described belong to this skeleton, and Flower and Gray on this account look upon this species as very dubious. According to Eschricht [3]) it is probable that a species belonging to this genus is to be found at Kamtschatka and the Aleootskia Isles, there sometimes kalled *Tschikagluch*, according to Chamisso, but it is far from likely, that this should be, as Eschricht, in consequence of the similitude between that name and Tikagulik, the Greenlandic name of the *Bal. rostrata*, supposes, identical with that species. Another species may probably occur in the northern part of the Pacific.

3. Genus FLOWERIUS, n. gen. [4]).

Form of the body slender and elongated, with rather small pectoral fins, and the dorsal fin small and situated very far back, somewhat in front of the posterior fifth of the entire bodys lenght. Processus coracoideus and acromion strongly developed, proc. coronoideus high. First pair of ribs have

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[1]) Catalogue. p. 382.

[2]) Das Leben der Walle. fol. Breslau. 1862.

[3]) Untersuchungen über die nordischen Wallthiere. p. 185.

[4]) Named after Dr. W. H. Flower, as a memorial of his services to cetological studies.

the upper end cloven or biceps and the lower largely emarginated. Number of vertebrae probably about 60, *all the cervical vertebrae separate. The atlas has the lateral processes above the middle and of a conical form. Only the epistrophaeus has annular side-processes. Number of ribs about* 14 *pairs.*

Of this genus there is as yet but one species with which we are acquainted, viz. the great Ostende- or Giant-Whale *Flowerius gigas* (ESCHRICHT), *Sibbaldius borealis* GRAY. By GRAY it has been ranged in the genus *Sibbaldius*, but it differs so much both in exterior and interior characteristics from the *Sibbaldius laticeps* GRAY and *Sibbaldius Schlegelii* FLOWER, that it ought in our opinion to be considered as the type of a separate genus. Its dorsal fin differs both in situation and form, and the lateral processes of its cervical vertebrae are different, &c.

4. Genus SIBBALDIUS, J. GRAY.

Form of body slender and elongated, with small pectoral fins, and dorsal fin of middle dimensions, and situated just behind the commencement of the posterior third of the body's length. Processus coracoideus and acromion strongly developed, processus coronoideus high. First pair of ribs with upper end cloven or biceps and the lower end not hollowed out. Number of vertebrae 55—58. *Lateral processes of atlas compressed, and situated in about the middle of the sides. The old individuals have the lateral processes on the epistrophaeus and nearest adjacent vertebrae annular. Number of ribs* 13—14 *pairs.*

According to FLOWER and GRAY we know with certainty two species of this genus, and tere is a third which according to GRAY may perhaps be considered as belonging to it. The first, *S. laticeps* GRAY, is from the North-sea and North Icy Ocean, the second, *S. Schlegelii* FLOWER is from the seas about Java; and the 3rd, *S. antarcticus* BURMEISTER, of which we know only the bladebone, and which therefore cannot with certainty be ranged in this genus, is from the seas about the south-eastern coast of South America, in the neighbourhood of Buenos-Ayres.

5. Genus ESCHRICHTIUS, J. GRAY,

including the species *E. robustus* (LILLJEBORG) or *Balaenoptera robusta* LILLJEBORG, of which more hereafter.

6. Genus MEGAPTERA, J. Gray.

Form of the body thick and compact, with long pectoral fins, provided with undulated margins; and a low dorsal fin, posited at the beginning of the posterior third of the bodys length. Processus coracoideus and acromion rudimentary or wanting, and processus coronoideus low but clearly recognizable. First pair of ribs single and undivided at upper end. Number of vertebrae 52—53. *Lateral processes of atlas compressed, and situated above the middle of the sides. None of the cervical vertebrae have annular lateral processes, and sometimes a pair of them has more or less grown together. Number of ribs* 14 *pairs.*

This is the most aberrant generic form to be found in the family of the Balaenopteridae, and in its thick form of body and short vertebrae it seems to betray an approach to the Balaenidae. The type of the genus is the *Balaena boops* Fabricius or *Balaena longimana* Rudolphi from the North-Sea and Nothern Icy Ocean. We have moreover *Megaptera Lalandii* (Fischer) from the seas around the Cape of Good Hope, and *Megapt. Osphyia* E. D. Cope [1]), from the sea to the East of the United States, and Gray enumerates besides four uncertain species, namely *M. Novae Zelandiae* Gray, from New Zealand, *M.? Burmeisteri* Gray, from the Ocean at Buenos Ayres, *M. Americana* Gray, from the Bermuda Isles, and *M. Kuzira* Gray, from the Japannese Waters.

2. Family *Balaenidae*, J. Gray.

No dorsal fin: under surface of body without grooves; whiskers long, fine and little if at all bent, the greater portion at least of the cervical vertebrae united &c.

1. Genus BALAENA, Linné.

Mouthopening, viewed from the side, forming a regular arch. First pair of ribs with upper end single. Bladebone with both acromion and processus coracoideus plainly visibles. Intermaxillary bone at the upper surface of the cranial snout but little broader than the upper jawbones. The anterior ribs with the lower end somewhat thin and compressed, and the number of ribs 13 *pairs. The whiskers with a single row of fine bristles on the border.*

We have as yet certain knowledge of only one species of this genus,

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[1]) Proceedings of the Academy of Natural sciences of Philadelphia. 1865. p. 168.

viz. *Balaena Mysticetus* LINNÉ, from the N. Polar Seas. Besides this GRAY reckons three other species to this genus. *Balaena biscayensis* GRAY, *Bal. marginata* GRAY and? *Bal. gibbosa* ERXL., of which the first does not, and the 2nd, which was found in the Western Australian seas, probably does belong to this genus, but is known only by its whiskers, and the third most probably does not really exist.

2. Genus EUBALAENA, J. GRAY.

Mouthopening, viewed from the side, forming an irregular arch, the back part rising almost perpendicularly. First pair of ribs single at upper and very broad at lower end. Bladebone without processus coracoideus, but with perfect acromion. Intermaxillary bone on the upper side of the cranial snout much broader than the upper jaw bones. Number of ribs 15 *pairs, and the* 2d *and sequent anterior pairs somewhat thin and compressed at their lower end. Whiskers provided with several rows of stiff edge-bristles.*

The type of this genus is the *Balaena australis* DESMOULINS, from the seas of Southern Africa. There is moreover a species, *Eubal. cisarctica* E. D. COPE [1]), from the ocean on the Eastern coast of the United States, the structure of the skeleton of wich is tolerably well known, and GRAY adds another species, *Eubal. Sieboldii* GRAY, from Japan, which however is only known i a Japannese porcelain model.

3. Genus CAPEREA, J. GRAY.

Skeleton indicates a body similar in form to that of the Eub. australis, and the back part of mouthopening, viewed from the side, is almost perpendicular, buth what particularly distinguishes this genus, is that the bladebone has only a rudimentary acromion and no coracoide process. First pair of ribs single at upper, and very broad and obliquely and slightly hollowed out at lower end. The form of the cranium seems similar to that af the Eubalaena. All the cervical vertebrae are united together. Number of vertebrae 55—56. *Number of ribs* 15 *pairs. According to Gray the tympanalbone has the form of an irregular oval rhomb, with the opening very small*

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[1]) Proceed. of Acad. of Natural Sciences of Philadelphia, 1865. p. 168. Cope expresses the suspicion of the identity of this Whale with the *Bal. Biscayensis*, but his description seems to indicate considerable differences between them.

at the upper end, and the increasing portion of the opening continued trough half the length of the bone [1]).

Only one species is known, *C. antipodarum* Gray, from the seas of New Zealand. In the court of the Muscum of comparative Anatomy at the Jardin des Plantes at Paris is preserved a complete and articulated skeleton, unquestionably belonging to the known species of this genus, and this is doubtless the same whose existence was reported to Gray by Milne-Edwards. By the side of the skeleton is a smaller model in Plaster of Paris of the whole animal, which however seems to us somewhat too slender. The individual, a female, from which the skeleton has been taken, was found in Acarva Bay, New Zealand, according to an appended ticket, which bare the erroneous name *Balaena australis.* The present osteological notice, the first published, of that genus, is founded on observations of this skeleton.

4. Genus HUNTERIUS, J. Gray.

According to the description given by Flower *(loco citato) of the structure of the cranium, it seems to approach that of the genus Eubalaena, and it is therefore probable that the mouthopening agrees in its curvature with that of that genus. Number of vertebrae about* 56. *The cervical vertebrae are not all united, the posterior ones are free. Number of ribs about* 15 *pairs, and the first pair remarkable for having the upper end cloven or biceps and the lover end deeply hollowed out. Several of the anterior ribs differ from those of the other genera in that the lower end is not thin and compressed, but very thick, and his section is an oval, approaching a circle. The bladebone has both acromion and processus coracoideus distinct and fully developed.*

Only one species of this genus is as yet known, *H. Temminckii* Gray, from the seas of the Cape of Good Hope. A cranium of an older specimen and an almost perfect skeleton of a younger are preserved, according to Flower, in the great museum at Leyden, and have been described by Schlegel under the name of *Balaena mysticetus antarctica* [2]). The corresponding form of the ribs as also of the bladebone in the Swedenborgian Whale, (the latter being provided with both acromion and coracoïde process) incline us to range that Whale to this genus. We consider it probable,

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[1]) The only ground that Gray has had for assuming the existence of this genus, is the form of the tympanal-bone.

[2]) Abhandl. aus dem Gebiete der Zool. und vergleichenden Anatomie. I. Heft. p. 37.

that the *Balaena biscayensis*, or Biscay-Whale ESCHRICHT belongs also to this genus

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ESCHRICHTIUS ROBUSTUS (LILLJEBORG).

Balaenoptera robusta, LILLJEBORG. Öfversigt af Skandinaviens Hvaldjur, p. 77.
Eschrichtius robustus, J. GRAY. Catalogue &c. p. 133.

In our work "Öfversigt af Skandinaviens Hvaldjur", printed in Uppsala Universitets Årsskrift for 1861 and 1862, we have given an account of such bones of this whale as have been discovered, but we consider that we ought to repeat that list before passing to a description of those bones. The bones found are:

The two lower jaw-bones.
4 cervical vertebrae: 1st, 3rd, 4th and 6th.
7 dorsal vertebrae: 1st, 3rd, 5th, 6th, 7th, probably the 13th and one of 9th—11th.
8 lumbosacral vertebrae: probably 1st, 2nd, 3rd, 5th, 6th, 9th, 10th and 11th.
14 caudal vertebrae: probably 1st, 2nd, 4th, 6th, 9th, 11th—17th, 19th and 20th.
4 processus spinosi inferiores.
1 processus transversus, which probably belonged to the 4th lumbosacral vertebra.
The right bladebone.
The left humerus.
The right ossa antibrachii.
6 carpal bones.
4 metacarpal bones.
4 finger-bones.
One of the cornua anteriora of the os hyoideum.
The sternum.
22 ribs, some imperfect, 12 belonging tho the right and 10 to the left side. 16 belong to 8 pairs i. e. are fellows. On the left side from the 11th to the 14th both inclusive, and on the right side the 3rd and 15th ribs are missing.

The lower jaw-bones (Pl I. figg. 1—4) furnishes one of the most important characteristics of this Whale. There is no other known Balaenopterid in which they have the same form. That which particularly distin-

guishes them is, that the processus coronoideus is rudimentary, in the form of a tubercle, widening a little at the outer side; that they are very little bent, and that they have the back end very high, higher than the rest of the bone, with a remarkably large condylus. As well in this last circumstance as with respect to the coronoïde process, they present an approxximation to the genus *Balaena*. The large condylus indicates that the cranium had large articular processes on the temporal-bones. Even their anterior termination is different from that of the other Balaenopteridae in as much as that it is nearly as much twisted as in the *Balaena*, so that the outer side almost is subjacent and horisontal, and the inner is for the most part directed upward. They are in proportion to their length higher than in any other Whalebone-Whale. Their upper part is, in front of the coronoïde process, compressed and thin, and stands about as high up as that process. On their outer side they present a slight uniform curvature, and there one remarks 7 oblong holes for vessels &c. The distance between the condylus and the great opening for the alveolar vessels and nerves is less, and thus the collum shorter than in the other Balaenopteridae, but not so short as in the *Balaena*. The back part of these bones is moreover distinguished by their lower or angular portion being as large as the condylar portion, and these are but little separated, and display on the back part a single continuous articular surface. The height or longitudinal dimension of the condylus is considerably greater than the transversal. The dimensions of the lower jaw-bones are[1]): Length 8′. 2″; height over condylus 1′, 5″; height over coronoïde process 11″; heigth in the middle $10\frac{1}{2}$″. From the length of the lower jaw-bones we may infer that this Whale's head was about 8′ long. The left lower jaw-bone is on the outer side much injured by caries. Though these bones differ greatly in form from those of the *Balaena*, being much shorter and higher, yet they exhibit in the character of the coronoïde process, as also in their hinder extremity and the strongly twisted forepart a stronger affinity to that genus than to any of the Balaenopteroïdes; and more especially these bones prove that this Whale may with reason be looked upon as the type of a separate genus.

The found *cornu anterius* (Pl. I. fig. 5) which is about 17″ long in a straight line, agrees with the ordinary form of that of the Balaenopteridae. It is slender and slightly curved, with the front side (*c*) concave and the back (*d*) convex, and the interior end (*a*), which is slightly turned

[1]) All measures are expressed in Sweedish "verkmått" which is nearly the same as English. 1 Sweedish Inch = 0^{in},9742 English.

upwards, somewhat depressed, with a round point and concave upper side, and with the outer end (*b*) almost round. This last mentioned end is not larger than the inner, which has on the under side a large oblong oval tuberosity somewhat projecting at the back edge of the bone, though not visible on the side exhibited in the figure. The front border of the bone is a little within the centre (*e*) sharp, and the back border a little without the centre has a projecting tuberosity, and the middle portion of the bone is somewhat flattened.

The *atlas* (Pl. I. figg. 6 and 7) is very strong and thick, and in form corresponds most nearly with that of the *Megaptera*, thoug it is still thicker, and deviates remarkably from that type in having a distinct hypapophysis (RETZIUS) (*a*), pointing backwards, and accordingly most projecting at the back part of the bone. (Fig. 7 *a*). It also differs in that the foramen spinale is broad at the upper part and forms an acute angle at the lower. It is somewhat oblique on account of the left lateral process going higher up than the right, and the articular surface for the left condylus occipitalis is larger than for the right. The fossae condyloideae, by carrying their upper and inner border a little inward, divide the foramen spinale into an upper and lower division. The lateral processes are short, compressed, blunt, and knotty, and their height considerably greater than their length. Their direction is somewhat oblique from the lower part backward, and they are situated above the middle of the sides of the bone [1]) and directed obliquely upwards and outwards. Between them and the upper edge of the fossae condyloideae, and nearer the latter, is a foramen for the arteria vertebralis, which pierces in an inward direction through the base of the arcus (neurapophyses OWEN). This foramen is shown in fig. 7 (*b*). The two fossae condyloïdeae or the concave articular surfaces for articulation with the condyli occipitales are separated at the lower extremity by a shallow furrow or sulcus, and extend with their lower border beneath the edge of the lower arcus, so that this latter is in its middle part hollowed out. The hypapophysis (*a*) is a blunt tubercle pointing backwards, its point extending beyond the level of the vertebra, and it was doubtless received in a corresponding fossa on the lower side and anterior border of the epistrophaeus. On the upper side of the upper arcus is a rudimentary processus spinosus or neural spine. When the atlas

[1]) In this respect this bone agrees with the corresponding bone of the *Megapgaptera*, but differs from that of the *Sibbaldius*, in which genus the lateral processes also have the short and compressed form, but project from the middle of the sides.

is wiewed from behind (fig. 7) the articular surface for articulation with the epistrophaeus appears almost in the form of a horse-shoe and undivided. It does not extend so high up as the fossae condyloïdeae and is at the middle of the side parts a little convex. Dimensions of atlas: Breadth between the extremities of the processus transversi $1'\ 5\frac{1}{2}''$; length or thickness of the sideparts (partes laterales) $3\frac{3}{4}''$; length of processus transversi $3''$; height of the same $4\frac{1}{2}''$; height of atlas $12\frac{3}{4}''$. It is a sensible defect in our description of this skeleton that the epistrophaeus could not be included in it.

The 3rd *cervical vertebra*, viewed from behind, (Pl. II. fig. 8)[1]) is distinguished by the strong dcvelopement of the lower branch of the lateral processes (parapophysis), which is much larger than the upper (diapophysis) and which, together with the latter, is inclined slightly backward. The corpus is concave bchind and convex is front, and of an almost rectangular form, with thc corners rounded off, and with a notch in the upper back border continued a little way downward as a shallow furrow. In the midst of the corpus is a low, blunt, longitudinal ridge. The arcus has a very small processus spinosus, but is distinguished by its considerable height, which is probably greater than in any other Balaenopteride, whence it appears that the height of the foramen spinale is nearly equal to its transversal measure[2]). The processus obliqui anteriores (Zygapophyses) arc less than the posteriores, but nevertheless distinct. The latter have tolerably large concave articular surfaces. Both the upper and under branches of the lateral processes, but especially the latter, are directed upwards, and the former have the point divided, or running out into an upper and lower process, of which the lower is directed to the upturned point of the lower branch, and the inconsiderable distance between them has probably been filled with cartilage. The corroded edges of these points show that they have been longer, and therefore the distance between them less, when they were entire; but it is evident that the lateral processes neither of this nor of the succeeding vertebrae have been annular. The upper branches have at the base of the anterior side a projecting keel or crista. The lower, larger branches are bent upwards, uneven at the lower border, at the hinder part of the base they are provided with a little projecting border, are thin and compressed at the points, are also there higher than on the other parts,

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[1]) We assume this on the ground of the uniform agreement of other Baleonopteridae in the size and direction of the lateral processes.

[2]) Gray considers the form of the foramen spinale as especially distinguishing this whale.

and have some signs of a division similar to that of the upper branches, the external border being concave. Dimensions of this cervical vertebra: Breadth of the corpus $8\frac{3}{4}''$; height of d:o . $6\frac{1}{2}''$; length of d:o . $2\frac{1}{4}''$; height of the vertebra $12\frac{1}{2}''$; distance between the extremities of the upper branches of the lateral processes $18\frac{1}{4}''$; d:o between d:o of lower $23\frac{1}{2}''$; height of these last at extremities $3\frac{1}{2}''$; height of the foramen spinale $5\frac{1}{2}''$; breadth of d:o $6\frac{1}{4}''$.

That which we look upon as the next or 4th *cervical vertebra*, since with respect to the form of the arcus and corpus, the position of the processus obliqui and direction of the lateral processes, it exactly fits into the preceeding or 3rd, is of a somewhat slenderer structure. The arcus is equally large and of the same form, and the occasion is accordingly the same with respect to the foramen spinale. Both the upper and lower branches of the lateral processes (diapophyses and parapophyses) are parallel with those of the foregoing, but both, and especially the lower, are slenderer than they, and not quite so much directed back. Here also the upper branch shows signe of a division at the extremity, but the lower process is there much longer. It does not however show any signs of having been united to the upturned point of the lower branch, but the interval between them has no doubt been filled up with cartilage. The lower branch has at the back of its base a somewhat stronger projecting border. The corpus has also here on the under side a blunt ridge, is concave behind and convex in front, but is thinner, and its length 2″. It is destitute of the notch which appeared on the hinder side and middle part of the upper edge of the preceeding vertebra.

That, which we look upon as *the* 6th *cervical vertebra* (Pl. II. fig. 9), shows a considerable agreement with the corresponding vertebra of the *Balaenoptera rostrata*, except that the corpus is less broad, and the foramen spinale rather larger and higher, though not so high as in the foregoing. The corpus is without ridge on the under side, and the upper branch of the lateral processes is much shorter and smaller than the lower, and both, though but little, directed forward. The corpus is concave in the middle both before and behind. The proccssus spinosus is higher than on the preceeding vertebra. The somewhat widening extremity of the lover branch of the lateral processes bears evident tokens of the adhesion of cartilage, with which the interval between the ends of the two branches has evidently been filled. At the base of the hinder side of the lower branches is an edge extending abruptly out backward, or a depressed process. Dimensions of that vertebra: Breadth of the corpus $7\frac{3}{4}''$; height of d:o 7″; height of

vertebra $13\frac{1}{2}''$; distance between the points of upper branches of lateral processes $17\frac{1}{4}''$; d:o between d:o of lower d:o $22\frac{1}{4}''$; length of corpus $2''$.

All the cervical vertebrae have been free. The epiphyses are fixed.

As, in addition to the first pair of ribs, which has been lost, there have been found 14 pairs in a more or less perfect state, this Whale must have had at least 15 pairs of ribs, and therefore 15 dorsal vertebrae. As the 14 pairs that have been found are consecutive, and the appearance of the 14th of them seems to indicate that it was the last, we have reason to suppose that it had not more than 15 pairs of ribs, and accordingly not more than 15 dorsal vertebrae.

The 1st *dorsal vertebra* (Pl. II. figg. 10 and 11) is as usual characterized by its thinner corpus and its lateral processes, which are compressed and largely inclined forward. The upper part of the arcus is lost. Its corpus is destitute of ridge on the lower side, and is in the midst of the epiphysis hollowed out both in front and behind. Looked at from the ends it is of a transversal oval form, with the upper edge almost straight. The foramen spinale is triangular, and its breadth is without question greater than its height. The processus obliqui anteriores are but slightly projecting, and the posteriores scarcely perceptible. The ends of the processus transversi are high, bent downwards, and strongly compressed. On the lower side of the left lateral process is a little articular surface, probably for the second or third ribs tuberculum. On the sides of the corpus, beneath the base of the lateral processes, and nearer the posterior border is a field, separated by a tuberosity projecting in front, partly covered by a harder osseous matter, and concave, which has probably been the point of fixation for the capitulum of the 4th pair of ribs, which is provided with a very long collum (Pl. VI. fig. 50). The epiphyses are firmly fixed to the bone. Dimensions of this vertebra: Breadth of corpus $10''$; height of d:o $6\frac{3}{4}''$; lenght of d:o on the under side $3\frac{1}{4}''$; distance between extremities of lateral processes $19\frac{1}{2}''$; length of lateral processes $7\frac{1}{4}''$.

The *dorsal vertebra* which we consider as *the* 3rd (Pl. II. figg. 12 and 13) has also its lateral processes inclined forwards, but its corpus is much thicker than the preceeding, and the external extremity of the lateral processes is of a different form, broad, not compressed, and provided on the under side with a concave articular surface. The corpus, viewed from either end is of a rounded oval form, with its tranversal dimension greatest, with upper edge concave, and with both the anterior and posterior surfaces plane. On the under side it has a low longitudinal ridge, and is concave on the sides between the edges without any traces of an articulating area.

The processus spinosus is tolerably high and directed backward. The processus obliqui anteriores et posteriores are plainly visible, and outside the former are tolerably high projecting processus mammillares (A. RETZIUS). The foramen spinale is subtriangular, and the transversal dimension considerably greater than the height. The lateral processes are short and thick, and the epiphyses are firmly attached to the corpus. Dimensions of this vertebra: Breadth of corpus $8\frac{1}{2}''$; height of d:o $6\frac{1}{2}''$; length of d:o $5''$; distance between extremities of lateral processes $17\frac{3}{4}''$; height of the vertebra to the top of processus spinosus $16\frac{1}{4}''$; breadth of ends of lateral processes $4\frac{1}{8}''$.

The *dorsal vertebrae* which we take to be *the* 5th, 6th *and* 7th were found lying together with the ends of their corpora in their natural position. The 5th and 7th agree accurately with the 6th as here represented, (Pl. II. figg. 14 and 15), and they differ from the third by their larger size, longer projecting neuralspine, and longer and broader lateral processes, which in all point backward.

The 5th differs from the other two in having its lateral processes shorter and less inclined backward, in being broader over the processus mammillares, and in having a broader foramen spinale. The 7th differs from the 6th only in having slightly longer lateral processes, and a narrower foramen spinale. The epiphyses are loose on all three. They are also loose on the succeeding dorsal vertebrae and on the two first lumbar vertebrae. We may therefore, according to FLOWER, consider this skeleton as that of a whale in the 2nd or "adolescent" period of life.

Th 6th *dorsal vertebra* (Pl. II. figg. 14 and 15), which we shall describe separately, has a corpus, when viewed endwise, rounded oval, with the transverse dimension greatest, and the upper edge slightly concave. Its sides, as well as the upper surface, are concave and smooth between the edges, and its under side strongly convex longitudinally in the middle, but not ridged. The foramen spinale is almost halfround, with the transversal dimension greater than the height. The processus mammillares are compressed, oblong, strongly projecting, and, as well as the processus obliqui anteriores, completely separated from the base of the lateral processes, but united with the base of the arcus. The processus spinosus (neuralspine) is high, much inclined backwards, cut off obliquely at the point, with rounded corners, and with the front sharp edge concave, when viewed from the side, and with the point something broader. The lateral processes are flattened with somewhat thicker points, and there on the under side and nearer the posterior angle, provided with a concave articulating cavity for the costa. Viewed from above these processes are considerably broader at

the points, with the fore edge a little but the back edge much bent backward, and somewhat concave at the terminal border. Their posterior edge is hollowed out at the base. Dimensions of this vertebra: Breadth of corpus $9\frac{1}{4}''$; height of d:o $7''$; length of d:o $6\frac{3}{4}''$; height of the vertebra to the point of the processus spinosus $18\frac{1}{4}''$; distance between extremities of lateral processes $2'.\ 4''$; length of the one lateral process at the anterior edge $9\frac{3}{4}''$; and of the other $10''$; length of the processus spinosus on the anterior edge $8\frac{1}{2}''$; distance between the external edges of the processus mammillares $7\frac{1}{4}''$.

The *dorsal vertebra*, which we consider as *the* 9th, 10th *or* 11th, differs from the 7th in that its corpus is longer and higher, its foramen spinale smaller, its lateral processes longer and more inclined backwards, its processus spinosus longer, and the distance between the external edges of the processus mammillares less. Compared with that which we take to be the 13th (Pl. III. figg. 16 and 17), it differs in having the lateral processes shorter and broader and with larger and deeper articular cavities at the point, the processus spinosus shorter, the foramen spinale broader, and the distance between the outer edges of the processus mammillares greater. These differences are then of the same kind as those that distinguish the 7th from it, and are conformable with the continuous change in the vertebrae throughout the whole dorsal region.

The *dorsal vertebra* which we take to be *the* 13th (Pl. III. figg. 16 and 17) is distinguished from those already described by the length of the lateral processes and processus spinosus, as also by the formers more slender form and inconsiderable articular-cavity at the end (fig. 17 *a*). The foramen spinale is also smaller than in the foregoing and its height and breadth about equal, and its form triangular, and the distance between the outer edges of the processus mammillares less. Viewed endways, the corpus is more rounded than in the preceeding, but the width is nevertheless considerably greater than the height, and the upper edge is slightly concave. On the lower side along the middle it is much convex, but without ridge, and the sides between the edges are concave. The processus obliqui anteriores and mammillares are long, and project from the anterior edge of the arcus. The processus spinosus, which is much inclined backward, and truncated at the point, has the anterior sharp border, viewed from the side, somewhat concave, its extremity being broader. The lateral processes are also much inclined backward, and have both the anterior and posterior edges, with the exception of the latters base, sharp, but a little within the middle of the former is a projecting rough protuberance. On this vertebra, as

well as on the preceeding, (9th, 10th, or 11th) and 5th, 6th and 7th there is above the posterior edge of the base of the lateral processes a hollow (fossa) sharply defined in front, which is deeper in the 5th, 6th and 7th. At the ends the lateral processes are thickened, but are yet provided with but an inconsiderable articulating hollow, which extends from the middle of the extremity obliquely under its posterior angle. Dimensions of this vertebra: Breadth of corpus $9\frac{1}{2}''$; height of d:o $7''$; length of d:o $7\frac{1}{2}''$; height of the vertebra to the top of processus spinosus $19\frac{1}{2}''$; rectilinear distance between posterior angles at the ends of lateral processes $2'\ 8\frac{1}{4}''$; length of lateral processes in anterior border $13''$; breadth of their ends $5\frac{3}{4}''$; length of processus spinosus in anterior border about $9''$; distance between external edges of processus mammillares $6\frac{1}{2}''$.

The vertebra, which we take to be the 1st *lumbosacral vertebra* (Pl. III. figg. 18, 19 and 20) is distinguished from the dorsal vertebrae in having its lateral processes longer, thinner, and less inclined backward, and without articulating surface for the ribs, and from the other lumbosacral vertebrae by these processes being thicker at the ends than in them. As for the rest in form it differs but little from the hindermost dorsal vertebrae, but has the corpus a trifle higher, the foramen spinale of greater height than breadth, and the distance between the external edges of the processus mammillares less[1]). It is by this characterized as a lumbar vertebra. Viewed endways the corpus is rounded oval, with the transversal dimension largest, and the upper border of the anterior end very slightly concave, but the same edge on the posterior end straight. The corpus on the lower side along the middle is very convex but presents no ridge. The lateral processes are very thin, especially at the anterior border, but at the point forwards they are thicker, especially the left. The processus spinosus displays about the same form as in the last described dorsal vertebra, but has not so broad a point when viewed from the side. The right processus mammillaris stretches farther forward than the left. Dimensions of this vertebra: Breadth of corpus $9\frac{1}{2}''$; height of d:o $7\frac{1}{4}''$; length of d:o $8''$, distance between extremities of lateral processes $2'\ 10\frac{1}{2}''$; length of lateral processes $13''$; height of the vertebra to the end of processus spinosus $20\frac{1}{2}''$; length of processus spinosus about $13''$; distance between external borders of processus mammillares $5\frac{3}{4}''$.

The 2nd *lumbosacral vertebra* is similar to the first, but the lateral

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[1]) In the form of the end of the lateral processes it agrees very nearly with the 1st lumbosacral vertebra of the *Balaena mysticetus*.

processes are thinner at the point, less inclined backwards, and have, when viewed from above, the concavities at the base in the fore and hinder edges about equal. Both this and the following vertebrae are without ridge on the under side of the corpus.

The 3rd *lumbrosacral vertebra* (Pl. III. figg. 21, 22, 23) likewise closely resembles the first, but its corpus has the upper edge of the fore end straight, and the convexity, along the middle of the under side is stronger; the foramen spinale is smaller, and its breadth greater than its height; the lateral processes stand out almost at right-angles, and the processus spinosus both in this and the preceeding vertebra is very slightly more inclined backwards than in the first. Dimensions of this vertebra: Breadth of corpus $9\frac{1}{4}''$; height of d:o $7\frac{3}{4}''$; length of d:o $8\frac{1}{2}''$; heigth of the vertebra to top of processus spinosus 21″; distance between extremities of processus transversi 2′ $11\frac{1}{4}''$; length of processus transversi 13″; length of processus spinosus about 12″; distance between external edges of processus mammillares 6″.

The *lumbosacral vertebra*, which we take to be the 5th is similar to the 3rd above described, but has its lateral processes sensibly broader (6″ broad, while those of the 3rd are but $5\frac{1}{4}''$), and along the middle of the under side of the corpus is an evident though not sharp ridge. In this as also in the folloving vertebra the lateral processes are still a little inclined backwards.

The 6th *lumbosacral vertebra* (Pl. IV. figg. 24, 25, 26) is similar to the 5th, but has the anterior end of the corpus more rounded, with the tsansversal dimension but inconsiderably larger than the height. The broader part of the lateral processes extends more nearly to the base, and their greatest breadth is in the middle [1]), and the ridge along the middle of the lower side of the corpus is sharper. The foramen spinale is little, and somewhat broader than it is high. Dimensions of this vertebra: Breadth of corpus in front $9\frac{1}{4}''$; height of d:o $8\frac{1}{4}''$; length of d:o $8\frac{3}{4}''$; distance between the extremities of the lateral processes 3′ 1″; length of right lateral process $14\frac{1}{4}''$; and of left d:o $13\frac{1}{4}''$; breadth of the right d:o $6\frac{1}{4}$: and of the left d:o $5\frac{3}{4}''$.

The vertebrae, which we take to be the 9th 10th and 11th *lumbosacral vertebrae*, are distinguished from the just described by a somewhat higher corpus and by shorter lateral processes, standing out at right angles,

[1]) In the second the broadest part of the lateral processes is nearer the extremity.

above which they have a long processus spinosus, and they are ridged along the middle of the under side of the corpus. There is very little difference between them, except that the 9th has the largest and the 11th the smallest lateral processes. The 10th (Pl. IV. figg. 27, 28, 29) has the corpus, when viewed endways (fig. 29) almost round, but the transverse dimension a little greater than the height. The lateral processes are broad in proportion to their length, and the left appears to stand more straight out from the side than the right, but this latter has been considerably corroded in the front border nearer the extremity. The processus mammillares are thin and the processus spinosus, viewed from the side, narrower towards the end, even allowing for the circumstance that the anterior border is in that part somewhat imperfect. The foramen spinale is small, and its breadth and height about equal, its form triangular, with an inward-directed flexure in the sides near the upper angle. Dimensions of that vertebra: Breadth of corpus $9\frac{3}{4}''$; height of d:o $8\frac{5}{8}''$; length of d:o $9\frac{1}{2}''$; distance between extremities of lateral processes 2′ 8″; length of right lateral process $12\frac{1}{4}''$; breadth of left d:o [1]) $6\frac{1}{4}''$; height of vertebra to the top of processus spinosus 22″; length of processus spinosus about 13″; distance between external borders of processus mammillares 6″.

In consequence of the differences that appear between the assumed 11th lumbosacral vertebra and that which we take to be the 1st caudal vertebra, ve assume that there have been 3 more lumbosacral vertebrae, situated between the above mentioned, and accordingly that there were 14 vertebrae belonging to the lumbosacral region.

The 1st *caudal vertebra* (Pl. IV. figg. 30, 31, 32) differs from the 11th lumbosacral in that the corpus is higher and the ridge on its lower side is blunt and terminates at the posterior extremity with a concave surface with two articular surfaces (fig. 31, *a*) for the processus spinosus inferior (haemapophyses), that the foramen spinale is less, that the lateral processes are shorter and slightly inclined forward, but inserted lower down on the sides of the corpus, and directed decidedly downwards. Its processus spinosus has probably been shorter [2]). Viewed from the front end (fig. 32), the corpus has the upper border, making the base of the oval-rounded foramen spinale, straight, but short. The upper lateral borders below this are long and but little curved, so that this end does not display a regularly rounded form.

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[1]) The left is much shorted, being much corroded about the extremity.

[2]) It corresponds to the vertebra that by ESCHRICHT and REINHARDT ("on the Northern Whale") has been considered as the last lumbosacral.

The height is less than the transversal dimension. The lateral processes are broadest about the middle and are at the base very slightly narrower. The area with which the lower ridge on the corpus terminates at its anterior extremity is plane. On the 11th lumbosacral vertebra it its somewhat convex. The articular-surfaces for the processus spinosus inferior in the hinder part are very small (fig. 31 *a*). Dimensions of this vertebra: Breadth of corpus $10\frac{7}{8}''$; height of d:o $9\frac{1}{2}''$; length of d:o $9\frac{3}{4}''$; distance between extremities of lateral processes 2′ 3″; length of lateral processes 9″; breadth of d:o $4\frac{1}{4}''$.

The 2nd *caudal vertebra* (Pl. V. figg. 33, 34, 35) is similar to the first, but has somewhat shorter lateral processes, articular surfaces for the processus spinosus inferior also in front, and along the under side of the corpus, from about half its length backwards, it has a groove, which in its back part at the right articular surface for the processus spinosus inferior (figg. 33 and 34 *a*) presents the anomaly of having a tolerably long, compressed process. Its dimensions, with the exception of the lateral processes, are the same as those of the last vertebra. Distance between extremities of lateral processes 2′ $1\frac{3}{4}''$.

The 4th *caudal vertebra* (Pl. V. figg. 36, 37, 38) is much mutilated, but it seems however that its lateral processes were less, and along the middle of the under side of the corpus it has a broad very shallow groove. The hinder articular surfaces for the processus spinosus inferior are very large. The processus mammillares are thick, and the distance between their external borders $5\frac{7}{8}''$; the processus spinosus is broad and short, with the point rounded off, and a convex anterior edge.

The 6th *caudal vertebra* (Pl. V. figg. 39, 40, 41) is distinguished from the 4th by a shorter and higher corpus, with a broader groove on the under side, an almost round foramen spinale, a smaller distance between the processus mammillares, and shorter lateral processes. Dimensions of this vertebra: Breadth of corpus in front $11\frac{1}{4}''$; height of d:o $9\frac{7}{8}''$; length of d:o $9\frac{1}{4}''$; distance between extremities of lateral processes 19″; height of vertebra to the top of processus spinosus 17″; distance between external borders of processus mammillares $4\frac{3}{4}''$; breadth of lateral processes $5\frac{1}{2}$; and length of d:o 5″.

The 7th *and* 8th *caudal vertebrae* are lost. That which we take to be the 9th (Pl. V. fig. 42) is distinguished by shorter corpus and smaller processes; for the rising right branch of the aorta passes through a hole (foramen) in the base of the right lateral process, and the corresponding left branch passes along a tolerably deep furrow obliquely over the base

of the left lateral process, and immediately over the hole through the base of the right lateral process i a short channel directed backward; because the foramen spinale is very small and transversally rounded off, and because the channel along the middle of the under side of the corpus is both broad and especially in its hinder part deeply concave, and there appears also in the middle of the under side a broad transversal groove. The lateral processes are quite short, but directed forwards, and their hinder angle strongly rounded off. Viewed from the ends the corpus is almost round, with the transversal dimension rather greater than the height. The sides are pretty deeply concave between the edges, both above and below the lateral processes. The processus mammillares are much decayed, but one can see that they were small and blunt. The processus spinosus is turned backward, with the point rounded off and decayed. Dimensions of this vertebra: Breadth of corpus $11\frac{1}{4}''$; height of d:o $9\frac{7}{8}''$; length of d:o $8\frac{1}{2}''$; length of left lateral process $2\frac{1}{2}''$; breadth of d:o $5\frac{1}{2}''$; height of vertebra to top of processus spinosus $13\frac{1}{2}''$; distance between external borders of processus mammillares $3\frac{3}{4}''$. Right lateral process imperfect.

In consequence of the great difference in the size of the corpus, as well as of the processes, between our assumed 9th caudal vertebra and the next succeeding of those discovered, we are compelled to assume that there has been a 10th, now lost, between them.

The 11th—17th, 19th, 20th *caudal vertebrae* (Pl. VI. fig. 43) display the usual rapid diminution of the hinder caudal vertebrae, as well with respect to the corpus as the arcus and processes, which latter both at last altogether disappear. They also undergo considerable changes with respect to the foramina for the side branches of the aorta. On the three first we find the arcus and decayed remains of the processus mammillares, and on the two first the lateral processes are distinctly visibles, with the anterior angle forming a projecting point. In all three the foramen spinale at the back part diminishes rapidly in size, and in the third is very small. On it (the 13th) the only indication of the lateral processes is a bump extending longitudinally over each side. The foramina, through which the above-mentioned right and left branches of the aorta pass, have even in the 1st (the 11th) of these vertebrae their origin on each side of the deep longitudinal canal on the under side of the corpus, and have their openings on the 11th and 12th vertebrae above the base of the lateral processes, and on the 13th above the bump that occupies their place, and over that opening is a bridge, under which the said artery passes. This bridge is narrowest in the 11th and broadest in the 13th. In the 14th these foramina have their upper

opening on the upper side of the corpus, at the outer side of the base of a low elevation or tuber there situated, between which two tubera, in the midst of the vertebras upper side, is a longitudinal narrow and deep fossa, instead of a foramen spinale. In the 15th, 16th, 17th, 19th and 20th they have their upper opening in the corresponding place, but on the three last there is an open channel connecting them; and they have their lower opening situated in the same place as in the foregoing, in a common fossa. The 16th and 17th as well as the 19th and 20th have, when viewed from the fore end, a subquadrangular form, with the corners rounded off. The 14th and 15th are more decidedly rounded off at the upper part. In all the caudal vertebrae the epiphyses are firmly attached. On the 15th and 16th the last traces of the articular surfaces for the processus spinosi inferiores are yet visibles.

Between the 17th and the next of the discovered vertebrae there is so great difference of dimensions, that it is evident, that there has been an 18th vertebra between them, which has not been found, and it appears as if the three extreme caudal vertebrae were lost; and it seems therefore probable that the caudal vertebrae were in all 23, so that the whole number of vertebrae, including the 7 cervical, the 15 dorsal and the 14 lumbosacral vertebrae, was 59 or about 60.

The 19th and 20th caudal vertebrae are in the middle of the ends, especially on the anterior side, very deeply hollowed.

Dimensions of these vertebrae: Length from the 11th to the 17th caudal vertebra both inclusive 3′ $3\frac{3}{4}$″; breadth of corpus, at anterior end, of the 11th $10\frac{3}{4}$″; height of d:o $10\frac{5}{8}$″; length of d.o $7\frac{1}{4}$″. Breadth of corpus, at anterior end, of the 12th 10″; height of d:o $10\frac{3}{4}$″; length of d:o $6\frac{1}{2}$″. Breadth of corpus at anterior end of 13th $9\frac{1}{2}$″; height of d:o 10″; length of d:o $5\frac{3}{4}$″. Breadth of corpus, at anterior end, of the 14th 9″; height of d:o 9″; length of d:o $4\frac{1}{2}$″. Breadth of corpus at d:o of the 15th $7\frac{1}{2}$″; height of d:o $7\frac{5}{8}$″; length of d:o $3\frac{3}{4}$″. Breadth of corpus at d:o of the 16th $4\frac{1}{2}$″; height of d:o $6\frac{1}{4}$″; length of d:o $3\frac{1}{4}$″. Breadth of corpus at d:o of the 17th $5\frac{3}{4}$″; height of d:o $5\frac{3}{4}$; length of d:o $3\frac{1}{4}$″. Breadth of corpus at d:o of the 19th $3\frac{3}{4}$″; height of d:o 4″; length of d:o $2\frac{3}{4}$″. Breadth of corpus of the 20th $3\frac{1}{8}$″; height of d:o $3\frac{1}{4}$″; length of d:o $2\frac{3}{8}$″.

Of the processus spinosi inferiores 4 have been found, of which the three are here represented Pl. VI figg. 44, 45, 46. The largest, fig. 44, from the highest point to the lower border is 8″, and its breadth at the lower part $6\frac{1}{2}$″.

Estimating the length of the head from that of the under jaw-bone, and the length of the lost vertebrae from that of those that have been found,

we may approximatively estimate the entire length of the skeleton at about 45—50 feet.

In proportion to the length of the skeleton the ribs are thiek and large, the length of the longest being about $\frac{1}{6}$ of the skeletons. This proportion shows that the form of the body was slender and elongated, most like that of the *Physalus musculus*, in which the longest rib is a trifle less than $\frac{1}{6}$ of the skeletons length, i. e. in the case of an old male (Bergens museum); slenderer than that of the *Balaenoptera rostrata*, where that length in a younger specimen is about midway betwen $\frac{1}{5}$ and $\frac{1}{6}$ of the skeletons, and in a still greater degree slenderer than that of the *Megaptera boops*, where the same length is about $\frac{1}{5}$ of the skeletons. Its bone-framework is however stout and strong, on which account we have given it the speeialname *robusta.* In form the ribs in general agree most with those of the *Physalus musculus*, but are comparatively something stouter and broader, and in that respeet exhibit a tendeney towards the form they have in the *Balaena*, to whieh genus they approximate also in the cireumstanee of the two pairs having a more strongly developed collum than any other Balaenopterid, and were possibly fastened by their eapitula to the corpora vertebrarum. All have the lower end tapering, but more or less thin and eompressed, and those that are foremost are pretty broad just above the tapering point, with tolerably sharp edges. From the number of them that have been found, as well as from the ordinary normal eontinuous ehange, whieh they show among themselves, we may with the greatest probability infer, that their number was 15 pairs, of whieh the first pair only is totally wanting. In all Whalebone Whales the first pair is broadest at the lower end, and as the first pair of the diseovered ribs of this whale has the lower end tapering, we are compelled to assume that these not are the first pair in the skeleton. As these ribs are very similar to the 2nd pair of the *Physalus musculus*, we eonsider that we are justified in assuming them to be that pair.

The 2nd *pair of ribs* (Pl. VI. figg. 47, 48) are distinguished from the following by greater breadth in proportion to their length, that breadth being espeeially remarkable a little above the lower end. At that end they are very thin with both edges sharp. They are not distinguished by any partieularly strong eurvature at the upper end, but they have there a "eapitular process" longer and sharper on the left rib (fig. 47) than on the right (fig. 48).

Of *the* 3rd *pair of ribs* only the lower portion of the left is found (Pl. VI. fig. 49). This fragment in respect to form stands between the 2nd and 4th pairs, as being somewhat narrower than the second pair,

and broader in the lower part rather nearer the lower end, than in the 4th, as is the case also in a higher degree in the 2nd pair; and as besides the next pair, with which it might be confounded, have been found entire, we conceive that we have full right to consider this fragment as belonging to the 3rd pair.

The 4th *pair of ribs* (Pl. VI. fig. 50, the left) is distinguished by considerable length and greatness, especially in the upper part, and moreover by a complete capitulum collum and tuberculum. They are also much curved at the upper end. Their collum is 7″ long. They are the largest of all, though the succeeding pair is but little less, and in length surpasses them. At about the beginning of the upper third of their length they have on the outer border a very slightly marked obtuse angle, between which and the tuberculum they are very broad. The tuberculum is about 2″ high, and the collum almost triangular in cutting through.

The 5th *pair of ribs* is similar tho the last but rather slighter and longer, 8′ along the outer curve, and has somewhat shorter collum.

The 6th *pair of ribs* (Pl. VI. fig. 51, the left) are slenderer than the foregoing and a little longer; also they are broader in the upper part and with a more or less marked angle in the upper edge at that part. They have also a distinct collum or capitular process, but it is much smaller, and the capitulum is scarcely perceptible Those of this pair are the longest of all the found ribs.

The 7th *pair of ribs* (Pl. VI. fig. 52, the left) are slenderer and somewhat shorter than the preceeding, with the upper end concave, and only a slight indication of a capitular process. They have the upper third a little broader, with a scarcely perceptible notch or angle in the outer border.

The 8th *pair of ribs* (Pl. VI. fig. 53, the left) is somewhat less than the foregoing, and is, like those which follow, entirely destitute of capitular process, but has however the upper end concave.

The 9th *pair of ribs* (Pl. VI. fig. 54, the left) is almost exactly similar to the last but a little shorter, and has a pair of obtuse angles in the outer border of the upper part, and the upper end but slightly concave.

The 10th *pair of ribs* (Pl. VII. fig. 55, the right) is far shorter than the 9th, and has the upper end somewhat sqare, with a longitudinal shallow concavity both on the front and back surfaces in that part. It has also some bumps, of which one near to the summit, between the anterior and exterior side, is the largest.

Of the 11th *pair of ribs*, we posses only a little more than the lower half of the right rib, and this fragment serves to show that this pair had much the same form as the 10th.

The 12th *pair of ribs* (Pl. VII. fig. 56, the right) is pretty much like the 10th but shorter. Immediately below the upper obtuse point it has an outer, an inner, and an anterior longitudinal ridge, and behind a little lower down a bump, and lower down on the posterior border a deep notch.

The 13th *pair of ribs* (Pl. VII. fig. 57, the right) has the upper end immediately under the extremity compressed, with an outer and inner tolerably sharp ridge. About the lower end it is moreover something broader than the last pair.

The 14th *pair of ribs* (Pl. VII. fig. 58, the right) is much less and slighter but not much shorter, than the last. The upper end is much compressed in the transverse direction, and the hinder border is uneven.

The 15th *pair of ribs* (Pl. VII. fig. 59, the left) is both less and shorter, especially the latter, than the 14th. It has an undulating curvature, and the upper extremity is not compressed, but thick, knobformed and oval.

Dimensions of the ribs:

Length along the outer convex edge of the 2nd left rib, exclusive of capitular process	5'.
d:o d:o from capitulum of the 4th left	7' 7''.
d:o d:o d:o d:o 5th d:o	8'.
d:o d:o d:o d:o 6th d:o	8' $1\frac{1}{2}$''.
d:o d:o from extremity of capitular process of 7th left . . .	7' $5\frac{1}{4}$''.
d:o d:o from the uppermost point d:o 8th d:o . . .	7' $0\frac{1}{2}$''.
d:o d:o d:o d.o d:o 9th d.o . . .	6' $7\frac{1}{2}$''.
Length measured along the outer convex edge of the 10th right rib .	5' $10\frac{1}{4}$''.
d:o d:o d:o d:o 12th d:o . .	5' $2\frac{3}{4}$''.
d:o d:o d:o d:o 13th d:o . .	5'.
d:o d:o d:o d:o 14th d:o . .	4' $8\frac{1}{4}$''.
d:o d:o d:o d:o 15th left . .	4' $2\frac{3}{4}$''.
Breadth of 2nd right rib at broadest part, at lower end	$4\frac{7}{8}$''.
d:o d:o d:o d:o upper	$4\frac{3}{4}$''.
d:o 3th left d:o d:o lower	$4\frac{3}{8}$''.
d:o 4th d:o d:o d:o	$4\frac{3}{8}$''.
d:o d:o d:o d:o upper	$5\frac{1}{4}$''.
d:o 14th right d:o d:o lower	$2\frac{7}{8}$''.
d:o 15th left d:o d:o d:o	$2\frac{1}{2}$''.

The breast-bone *(sternum)* (Pl. VII. fig. 60) is much decayed, but seems to have preserved its characteristic form, which also furnishes a distinguishing mark of this Whale. It is concave at the anterior edge, with a broad obliquely cut winglike projection on both sides of the front, and running out behind into a long round pin or process. At the base of this projection on either side, obliquely opposite to eachother, is an rough process, which in all probability served to fasten the cartilage, wich united the 1st rib to the breast-bone. The upper side is concave and the lower somewhat convex. Its length is $11\frac{1}{4}''$, the breadth between the ends of the winglike projections $1'\ \frac{1}{4}''$.

The bladebone *(scapula)* (Pl. VIII. fig. 61, 62) is also characteristic of this Whale. It is not so broad as in other Balaenopteridae, though not much less than that of the *Megaptera*, but broader than that of the Balaenidae, and seems in that respect to stand between the two forms. Its breadth at the upper part is greater than the length from the cavitas glenoidalis to to the upper edge by nearly $\frac{1}{3}$ of the former. It is hollowed out in the middle of the outer side. The acromion is broad and large, and the processus coracoideus, though much shorter than the acromion, is yet tolerably long and thick, with the point rounded off. The cavitas glenoidalis, viewed en face, is almost rhomboïdal. The spina scapulae extends upward against to the upper edge, and nearer the acromion its border is far in front of the other edge of the bladebone. The bones length is $2'\ 8\frac{1}{2}''$; its breadth $3'\ 6\frac{1}{2}''$. Breadth of collum $1'$. Acromion $9''$ long, and proccssus coracoideus $5\frac{1}{4}''$.

The os humeri (Pl. VIII. fig. 63, the left, seen from the outside) is like that of the Balaenopteridae in general, and somewhat more elongated than that of the Balaenidae, and has a caput subterminale and not so obliquely directed as in these last. A part of the tuberculum majus is lost, and that protuberance seems not to have been particularly large. The anterior edge, *(spina tuberculi majoris)*, which goes directly down from the tuberculum majus to the lower end, is tolerably sharp, and the corpus of the bone has a rather compressed form. Lower down and on the outer side of the anterior border is a tolerably deep hollow, and on the outer side nearer the upper end there is a low crista passing obliquely over the middle of the bone. On each side of the articular surface for the upper end of the ulna is a ridge or crista and the inner of these is at its back part divided into two by a sulcus. The two articular surfaces for the radius and ulna form a very obtuse angle with eachother. The length of the bone is $1'\ 9\frac{1}{2}''$; its breadth at the upper end $11\frac{1}{4}''$; do at the lower $11\frac{1}{2}''$.

The lower arm-bones *(radius and ulna)* (Pl. VIII. fig. 64, the right) are in form not quite so elongated as those bones usually are in Balaenopteridae, but in other respects present nothing remarkable, exeept that the ulna has a very large olecranon, conically pointed at the upper part. Both have the anterior edge convex and the posterior concave, and the lower end of the radius reaches below that of the ulna. The rectilinear length of the radius is 2′ $5\frac{1}{2}$″; that of the ulna between the articular surfaces 2′ $2\frac{3}{4}$″; breadth of radius in the middle $6\frac{3}{4}$″; d:o of ulna 4″.

Of the *carpal-bones* or bones of the carpus six have been found (Pl. VII. figg. 65—70), of which however one is very small and has only one surface complete. As they were found in the immediate neighbourhood of the right lower-arm-bones it seems probable that they belong to the right pectoral fin. The same is the case with the four metacarpal bones that have been discovered (figg. 71—74), and the four phalanges that have been found, and of which the three are here represented (figg. 75—77). The *metacarpal-bones* are comparatively short and thick, and have probably had their respective positions from the innermost to the outermost in the order indicated by the numerical series, and the number of fingers was accordingly only 4, as in other Balaenopteridae. Their respective lengths are: N:o 71 $5\frac{1}{4}$″; N:o 72 $6\frac{1}{2}$″; N:o 73 $5\frac{3}{4}$″ and N:o 74 $5\frac{1}{2}$″. *The phalanges* (figg. 75—77). It is scarcely possible to assign to these their respective positions. Besides the 3 here represented a 4th, as we have already intimated, has been found. It is exactly like the largest of these. The length of this last is $6\frac{1}{2}$″, that of the next in size $5\frac{3}{4}$″, and that of the smallest $5\frac{1}{4}$″. The two largest are comparatively thicker, and the section through the middle is oval, but the two smaller ones are more flattened, and from this we may conclude that they have been situated farther from the base of the fingers, whereas the larger ones were probably basal-phalanges.

We may conclude from the preceeding description that, among the discovered bones, the under jaw-bones, the cervical vertebrae, the sternum and scapula are those which present the distinguishing features of the Genus *Eschrichtius*, which has been constituted by J. E. GRAY for this Whale. We therefore characterize that genus as follows:

Genus ESCHRICHTIUS, J. E. GRAY.

Proceedings of the Zoological Society 1865.

Maxilla inferior processu coronoideo brevissimo, tuberculiformi, et altitudine maxima ad condylum posita; ramis antice valde tortuosis. Atlas cras-

sissimus, processibus transversis verticaliter oblique compressis, brevibus, superioribus, arcu inferiore hypapophysi postico Vertebrae ceterae cervicales foramine spinali fere aeque alto ac lato, omnes processibus transversis apertis. Sternum antice latum, excavatum, processibus lateralibus magnis, alaeformibus, oblique truncatis; postice processu longo, teretiusculo, acuminato, ad basin processus articulares pro cartilagine paris 1mi *costarum gerente. Scapula acromion et processum coracoideum gerens, latitudine longitudinem* 3ta *fere parte superante.*

Species unica:

E. ROBUSTUS (Lilljeborg).

E terra in Svecia media in Upplandia effossus.

In the above cited work on the Cetacea af Scandinavia[1]) I have given a detailed account of the circumstances under which the Whale-bones here described were found: that the field in Gräsö, Roslagen, where the bones were dug up, lies 10—15 feet above, and 840 feet distant from the sea; that they lay partly in sand and partly in clay, at a depth of from 2 to 4 feet; and that with them were found shells of the *Mytilus edulis* and *Tellina balthica* of precisely the same appearance as those now met with in the Baltic.

J. Gray states[2]) that he has received from the shores of the English Channel a pair of cervical vertebrae of this Whale, which had been thrown on shore by the waves at Babbicombe Bay. He has appended a figure of the one of them, which presents a close agreement with the above described in the form of the corpus and direction of the lateral processes, but, as it is destitute of arcus, the identification cannot be considered as absolutely certain.

HUNTERIUS SVEDENBORGII, n. sp.

The bones discovered show, that the individual to which they belonged was wery young, but the caput of the bladebone shows nevertheless evident signs of the place of junction of an as yet cartilaginous processus coracoideus; and partly on this ground, partly on that of the peculiar form

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[1]) Öfversigt af Skandinaviens Hvaldjur, Upsala Universitets Årsskrift 1861 och 1862; afterwards published by the Ray Society 1866 in English.

[2]) Catalogue of Seals and Whales in the British Museum, pag. 133 and 373.

of the ribs, which, as far as we are aware, agrees only with that of the genus *Hunterius* GRAY, we consider that the Whale to which these bones have belonged ought to be classed under that genus. We have unfortunately not been able to perfect by personal examination our knowledge of the skeleton of the only known species of this genus, *Hunterius Temminckii*, preserved in the great museum at Leyden, and consequently we know the form of its bones only from the description given by Dr FLOWER in the above-mentioned treatise, and some rapidly made sketches, which Dr FLOWER has had the kindness to communicate. Dr FLOWER has indeed only described the first and second pairs of ribs, both of which are missing from among the Swedenborgian Whale's bones, but the 3rd, 4th and 5th are among those found, and the first of these, as is well known, differs from the 2nd pair only in being somewhat narrower and longer, and both it and the two following pairs show, allowing for this normal difference, a close agreement with FLOWER'S description of the second pair, "very thick and broad at the lower end." We know of no other genus in the whole group of Whalebone Whales whose foremost ribs present so thick a form at the lower end. The bladebone of the Swedenborgian Whale differs so widely in the form and position of the acromion from that of the *Hunterius Temminckii*, that it is immediately evident that they belong to different species. Moreover the former is distinguished by its unusual thickness, which however may perhaps be ascribed to the circumstance of its having belonged to a very young individual.

We have in the above mentioned treatise on the Scandinavian Whales given an account of the circumstances under which the bones of the Swedenborgian Whale were found, and shall therefore only recite here, that they were in November 1705 dug up at Wånga in West Gothland, 12 Sweedish miles (about 80 English miles) from the coast, and 330 feet above the level of the sea, and that, little more than a century after, the late Major L. GYLLENHAL, when digging a spring at the same spot, on the estate Höberg, chanced "at a deep cutting in of a brook" [1]) to meet with a vertebra of the same skeleton, fitting exactly to the others, and presented it to the Royal Academy of Sciences in Stockholm 1823. This latter discovery is a most useful guide in identifying the spot where the original discovery took place, and where a renewal of the diggings might lead to results of the highest interest both to zoological and geological science.

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[1]) According to a kind communication in a letter from Lector N. E. Forssell at Skara the name of the brook is Fjölbrobäcken.

The entire number of the bone-fragments discovered amounts to 51. Of these 12, including the vertebra in the possession of the Royal Academy of Sciences, are vertebrae apparently all belonging to the caudal region, not consecutive, but with several gaps between them[1]); 16 vertebral epiphyses, that have been attached to the ends of these vertebrae, of which epiphyses however two do not belong to the caudal region, but seem to have been attached to the lumbosacral vertebrae; the breast-bone, one bladebone, and 22 fragments of ribs. No rib is unbroken, and of the bits it has been possible to put together only three ribs, one of which is somewhat injured at the lower end. Moreover 4 bits combine two and two into two fragments of ribs. The remainder are separate fragments which cannot be put together. The loose vertebral epiphyses, the very porous ends of the ribs, the thick and very porous upper edge of the bladebone, the blunt and porous extremities of the vertebral processes, and the comparatively small size of the bones, all show that these bones belonged to a very young subject. Nevertheless the arcus of the vertebrae is fully developed, and, as well as the processes, firmly attached. The bones are not petrified, but still generally very hard, and some of them pretty heavy, considerably heavier than they would have been, especially since they are young and very spongy, if they had not so long lain in moist earth. On the vertebra, presented by Gyllenhal to the Royal Academy of Science, a little of the soil in which it lay remains still attached, evidently showing that that soil was clay.

The *first of the discovered vertebrae* (Pl. IX. figg. 78—81) seems to have been either the 1th or 2 nd caudal vertebra. There are marks of the articular surfaces for the processus spinosus inferior both in front and behind, so that the vertebra is more probably the 2nd. It has the lateral processes much broader than on the next of those that have been found (figg. 82, 83), which we take to have been separated from the other by one lost vertebra. Both the processus spinosus and the processus mammillares are alike in both, but the foramen spinale is larger in the former. The lateral processes are pretty much bent downwards, broader toward the end, and with a concavity on the anterior edge at the base, for the ascending branch of the aorta. The corpus has on the under side no longitudinal channel, but is on the contrary transversally holloved both here and on the sides under the lateral processes. Dimensions of this vertebra: Breadth of corpus in front $7\frac{1}{2}''$;

[1]) A renewed examination of these vertebrae has caused to make certain modifications in the explanation of them given in our Treatise on the Scandinavian Cetacea.

length of d:o, exclusive of epiphysis, $3\frac{5}{8}''$; height of corpus in front 6''; height of vertebra to top of processus spinosus $10\frac{1}{2}''$; length of processus spinosus 3''; d:o of processus transversi $3\frac{3}{4}''$; distance between external borders of processus mammillares $3\frac{1}{4}''$.

The next of the discovered vertebrae or that which we take to be the 4th caudal vertebra (Pl. IX. figg. 82, 83) is, as we have already said, similar to the 2nd, the only deviations being that it is rather smaller, has less lateral processes and a smaller foramen spinale. The concavity on the under side of the corpus, and on the sides beneath the lateral processes is more marked. The articular areae for processus spinosi inferiores are more distinct, and from the outer side of both there extends inwards towards the under side of the vertebra a ridge more distinct on this than on the second. Dimensions of this vertebra: Breadth of corpus $7\frac{3}{8}''$; height of d:o in front 6''; length of d:o without epiphyses $3\frac{1}{2}''$; length of processus spinosus $2\frac{5}{4}''$; d:o of processus transversi $3\frac{3}{4}''$; breadth of d:o $2\frac{1}{2}''$; distance between external borders of processus mammillares $3\frac{1}{2}''$.

The vertebra which we take to be the 6th *caudal vertebra* (Pl. IX. figg. 84—85) presents generally the same form as the last, with the same form and the same direction forward and downward of the lateral processes, but differs sensibly from it by its smaller lateral processes, processus spinosus, and foramen spinale, and by its thicker and more separated processus mammillares. The transversal groove formed by the concavity below and at the sides of the corpus is deeper and narrower than in the preceding. Above the lateral processes there is also on the sides of the corpus a deep concavity between the anterior and posterior borders. Dimensions of this vertebra: Breadth of corpus in front $7\frac{1}{4}''$; height of d:o d:o $6\frac{1}{8}''$; length of d:o, exclusive of epiphyses, $3\frac{3}{8}''$; length of processus spinosus 2''; d:o of processus transversi $3\frac{5}{8}''$; breadth of d:o 2''; distance between external borders of processus mammillares $4\frac{5}{8}''$.

Between the last described vertebra and that which follows there is so considerable a difference in the size of the processes, that they cannot possibly have been contiguous, and we are obliged to assume, that there has been a vertebra between them[1]), whence it follows that we take the vertebra represented in Pl. IX. figg. 86—87 to be the 8th *caudal vertebra.* It is immediately evident that its processus spinosus is much lower,

[1]) It should here be remarked, that the gap between these vertebrae (figg. 84—86 and 85—87) has unfortunately, by an oversight, not been observed in the figures, where they have been placed in contact.

the processus mammillares thicker, and the lateral processes much shorter and less inclined downwards. The transversal channel or concavity between the anterior and posterior insertions of the processus spinosi inferiores is considerably narrower than in the last described bone, and the foramen spinale is much less, and also transversally oval. Dimensions of this vertebra: Breadth of corpus in front $7\frac{1}{8}''$; height of d:o $6\frac{1}{2}''$; length of d:o, exclusive of epiphyses, $3\frac{1}{4}''$; height of processus spinosus $1\frac{1}{2}''$; length of processus transversi $2\frac{3}{8}''$; distance between external borders of processus mammillares $5\frac{3}{8}''$.

The next vertebra (Pl. IX. figg. 88—89) has no doubt been immediately contiguous to the preceeding, and differs but little from it, and is accordingly the 9th caudal vertebra. Its processes are however something shorter and its foramen spinale something smaller.

The next following *caudal vertebra* [1]), which we take to be 10th (Pl. X. figg. 90—93) has lost its arcus. The backwards gradually diminishing developement of the processes is visible on it as on the others. In this vertebra the foramina for the branches of the aorta first appear, and are carried through the base of the lateral processes [2]). The transversal groove on the under side and on the lower sides of the corpus is deep, and above the lateral processes the latter is also much holloved out at the sides, but the channel for the branch of the aorta is there but inconsiderable. Dimensions of this vertebra: Breadth of corpus in front 7″; height of d:o 7″; length of d:o, exclusive of epiphyses, 3″; length of lateral processes $1\frac{1}{2}''$; distance between external borders of mammillary processes 5″.

The 11th *caudal vertebra* (Pl. X. figg. 94—95) is very nearly similar to the last, and only differs from it in having the foramen spinale considerably smaller, and the distance between the outer borders of the processus mammillares rather less. The foramina and canals for the branches of the aorta are similar, with the exception of the former being a little less.

The 12th *caudal vertebra* (Pl. X. figg. 96—97) presents on the con-

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[1]) This is the bone that the late Major Gyllenhal presented to the Royal Academy of Science. We have, through the kindness of Prof. Angelin, had the opportunity of directly comparing it with those preserved here.

[2]) In this respect a great difference prevails between this Whale and the Northern *(Bal. Mysticetus)* in wich, according to Eschricht and Reinhardt, these foramina are found as soon as in the second (in our opinion 3rd) caudal vertebra; and the lower channel for the side-branches of the aorta forms a closed canal in the Northern Whale already in the 4th (5th) caudal vertebra, but in the present specimen not before the 15th.

trary pretty considerable differences from the foregoing, by a remarkable reduction of the processes, as well the processus mammillares as the pr. spinosus and processus transversi. The foramina for the side-branches of the aorta pass through the base of the lateral processes in the same manner as in the preceeding, but above the lateral processes there is on the sides of the corpus a somewhat more visible concavity for the said side-branches, and at the back edges of the arcus is a deeper rounded notch for them on their passing into the canalis spinalis. This notch is shallow and wide in the preceeding vertebra. The half-canals between the front and back articular processes for the processus spinosi inferiores are narrover. Dimensions of this vertebra: Breadth of corpus in front 7″; height of d:o $6\frac{1}{2}$″; length of d:o without epiphyses, 3″; length of processus spinosus 1″; d:o of prosessus transversi $\frac{3}{4}$″; distance between external borders of processus mammillares 4″; foramen spinale $\frac{7}{8}$″ broad and $\frac{3}{4}$″ high.

The 13th *caudal vertebra* (Pl. X. figg. 98, 99) differs from the foregoing in the same manner as it differed from the 11th, though comparatively in a somewhat higher degree. The lateral processes are only indicated by a longitudinal ridge over the side, and the base of them is perforated by the foramina for the side-branches of the aorta. The processus mammillares are rudimentary as also the processus spinosus. The canal for the said branches in the upper part of the sides of the corpus above the lateral processes is deeper than in the foregoing vertebrae, and in this the notches in the hinder borders at the base of the arcus have become foramina. The foramen spinale is smaller than in the last. Dimensions of this vertebra: Breadth of corpus in front, exclusive of the said side-ridges, $6\frac{1}{2}$″; height of d:o d:o $6\frac{1}{2}$″; length of d:o, exclusive of epiphyses, $2\frac{3}{4}$″.

Between the 13th and the next of the discovered caudal vertebrae there is so great a difference that we assume that atleast one lost caudal vertebra has been situated between them. That which we accordingly take to be the 15th *caudal vertebra* (Pl. X. figg. 100, 101) is entirely destitute of ridge on the sides, as also of processus mammillares, and has the processus spinosus only slightly indicated. The foramen spinale is very small. The foramina or channels for the branches of the aorta have the one opening above the middle of the sides of the corpus, and the other far down in the sides, and they have moreover an opening on each side of a large cavity on the under side of the corpus. Over the upper opening is a short, open canal, subsequently carried upward under a broad bridge and terminating in the back part of the foramen spinale. Dimensions: Breadth of corpus in front $5\frac{1}{2}$″; height of d:o d:o $5\frac{3}{4}$″; length of d:o, exclusive of epiphyses, $2\frac{1}{4}$″.

The 16th *caudal vertebra* (Pl. X. figg. 102, 103) is somewhat smaller than the last, is destitute of arcus, and has the canalis spinalis only on the sides bordered with projecting processes. As regards the foramina for the branches of the aorta, the one of them on the lower sides, namely the right, is closed, and thus for the right canal there is in the lower part only one opening, in the cavity on the under side of the corpus. At the lower part of the left side there is on the contrary a very small opening besides the larger one in the under cavity. Dimensions of this vertebra: Breadth of corpus in front $5\frac{1}{4}''$; height of d:o d:o $5\frac{1}{4}''$: length of d:o, without epiphyses, $2''$.

The last of the discovered vertebrae, or that which we take to be the 17th caudal vertebra (Pl. X. figg. 104, 105) is almost circular. There are only 2 lower openings to the canals for the aorta-branches, situated in the cavity of the under side. Of the canalis spinalis all that remains is a very little hollow, at the bottom of which are three small foramina. Dimensions: Breadth of corpus in front $4\frac{3}{4}''$; height of d:o d:o $4\frac{3}{4}''$ length of d:o, without epiphyses, $1\frac{3}{4}''$.

The *breast-bone* (Pl. 11. fig. 106) presents the simple form that it usually has in the Balaenidae. It is oval, longer than it is broad, the forepart rounded, and with a little concavity in the right border near the point. The hinder end is pointed, so that the side-borders there form an angle somewhat less than a right angle. The side-parts are very convex in the middle, also rather thinner and bent obliquely upwards. It is hard and solid, but the porous and thick edges indicate that it was entirely imbedded in cartilage. It is particularly remarkable that that bone is so fully developed, and shows such considerable hardness, although other parts of the skeleton show that it belonged to a very young animal, and although the sternum otherwise does not ordinarily at so young an age attain such thickness and hardness. Its dimensions are: Length $6\frac{3}{4}''$; breadt $4\frac{7}{8}''$; thickness in the middle $1\frac{1}{4}''$.

The three perfect ribs (Pl. X. figg. 107—110 and Pl. XI. fig. 111), which we may consider as belonging to the 3rd, 4th and 5th pairs, are particularly characteristic for this Whale, as has already been remarked. All three belong to the right side. The first of them (fig. 107) is not quite perfect at the lower end, but it seems to be only a very small portion that is lost. In proportion to its length it seems remarkably broad at the lower end, which shows that it must be one of the anteriors. The upper end is much compressed and bent inwards, with a rounded-off projecting angle at the upper border, without visible capitular process, for the extremity itself

is abruptly truncated and high. The inner side of the bone is sharp in the upper part. Its lower end is thick, but not so thick as that of the next rib, and its section at that part nearly elliptical. Its length measured along the external edge of the curvature 3′ 1″; its breadth at the lower end $3\frac{1}{2}$″; and its thickness in that part $1\frac{5}{8}$″.

The next following *or* 4th *rib* (fig. 108) is somewhat larger and longer, and also thicker at the lower end, where it has tolerably visible longitudinal furrows. Its section there is almost oval. The upper end, which is strongly compressed and thin, is pointed, and exhibits some appearance of a capitular process. Its length measured along the outer curvature is 3′ $9\frac{3}{4}$″; breadth at lower end $3\frac{1}{2}$″; thickness at that part $1\frac{3}{4}$″.

The next following *or* 5th *rib* (fig. 109—111) is like the preceeding, but rather longer, and at the lower end narrower and thicker, and ovally rounded in the section (fig. 110). At the upper end this rib also is compressed, but somewhat more strongly curved than the foregoing and with an almost similarly insignificant capitular process. Like the foregoing its lower end has evident signs of longitudinal furrows. In all three ribs this end is very spongy at its extremity, and seems there to have been provided with a still cartilaginous termination. Dimensions: Length along the outer curvature 4′ 2″; breadth at lower end 3″; thickness at d:o 2″.

The two pieces of ribs, each consisting of two fragments, belong to the left side, and the ribs, of which they have formed a part, have been narrower and longer than those above described. The longest, which is also narrowest, is almost round at both ends, and it, as well as the other fragment, belongs to the middle part of the rib, both the upper and lower ends being lost. The narrower, measured along the external curvature, is 2′ 7″, the other piece 2′ $6\frac{1}{8}$″, the first at the lower end $1\frac{3}{4}$″, the last $2\frac{3}{8}$″ broad. The situation of the latter has without doubt been more forward.

The *blade-bone (scapula)* (Pl. XI. figg. 112, 113, the left) is also of the highest importance in classifying this Whale. All the cartilaginous portions that were atached to this bone are lost. The acromion is tolerably long, but its thick, abruptly truncated and spongy extremity shows that it had a cartilaginous continuation, and accordingly is not fully developed. The processus coracoideus is absent, but the caput scapulae shows at the anterior angle (*a*) an ascending rough surface, which has no doubt served for the fixing of this process as yet in a cartilaginous state, for it, as is well known, is much later developed than the acromion. On this ground we assume that this species is provided with a processus coracoideus. Both the form and position of the acromion in this Whale differ from those which,

according to the drawings kindly communicated to us by Dr Flower, they have in the *Hunterius Temminckii*. In the latter it is farther removed from the caput and has the form of a projecting acute angle, and is not truncated at the point. In the species before us the distance between the acromion and the cavitas glenoidalis is small, and accordingly the collum scapulae very short. The form of the bladebone exhibits a general agrement with that of the Balaenidae, and its breadth at the upper part is not so much greater than its length. It is however at the upper edge thicker than usual, but that is doubtless a consequence of the animals tender age, especially as that edge is irregular and spongy, so that the bone has evidently had a great cartilaginous continuation. Both the anterior and posterior borders are concave. On the outer side it is somewhat concave with radial, broken furrows. From the acromion the spina scapulae extends so far upwards, that it is discernible above the middle of the bone. The caput, viewed endwise (fig. 113), is of an oval form, hollowed out in the middle, with an acute angle in front and rounded off behind, with a scarcely perceptible obtuse angle there. Its outer border is somewhat more convex than the inner. Dimensions: Breadth at upper part 1′ $3\frac{3}{4}$″; length 1′ 2″; breadth above base of acromion $5\frac{3}{8}$″; d:o of collum $4\frac{3}{8}$″; length of acromion $1\frac{3}{4}$″; thickness of upper border of bladebone 1″.

ADDITION.

Since the above was written three bones of the imperfect whale-skeleton last described, of the *Hunterius Svedenborgii*, have been recovered by Professor F. Sundewall, of this University, and presented to the University's Zoological Museum. These bones are: one caudal vertebra, right bladebone and part of a rib. As they are perfectly similar to those above described, they do not contribute any addition to our knowledge of this Whale, but they afford some confirmation of the views we have taken.

The vertebra has evidently occupied a place between the 3rd and 4th of those above described, and is accordingly, according the probable calculation there made, the 7th caudal vertebra, which was there said to be missing. Its lateral processes are less than those of the 6th, but longer and slenderer than those of the 8th. The processus spinosus and processus mammillares agree entirely with those of the last-mentioned, and the foramen spinale is lower than in the 6th, but a little larger than in the 8th. The arti-

cular surfaces ("Hjörner", corners, ESCHR.) for the processus spinosi inferiores, especially the hinder ones, are larger and more prominent, as also wider apart than in the 6th, but less than in the 8th, and the transversal groove between them is deeper than in the 6th, but shallower than in the 8th. The distance between the outer edges of the processus mammillares is greater than in the 6th, and about equal to that in the 8th. It accordingly appears in all its characteristics to lie between the two above mentioned (6th and 8th) caudal vertebrae. In the form of the lateral processes it agrees however more nearly with the 6th than with the 8th. Its dimensions are: Breadth of corpus in front 7″; height of d:o d:o $6\frac{1}{2}$″; length of d:o, without epiphyses, $3\frac{1}{4}$″; height of processus spinosus $1\frac{3}{4}$″; length of processus transversi $2\frac{1}{2}$″; distance between outer edges of processus mammillares $5\frac{1}{4}$″.

The blade-bone is precisely like that we have described, but its upper edge is more corroded and uneven, and the bone accordingly somewhat shorter. The point of attachement for the cartilaginous coracoïde process is similar to that of the left bone, as also is the acromion.

The rib-fragment appears to have been part of one of the hinder ribs, but both the upper and lower extremities are wanting.

To the above made enumeration of some valuable contributions to a more accurate knowledge of the Whalebone Whales we may add a worthy treatise on the external characters and a part of the anatomy of *Physalus antiquorum*, by JAMES MURIE, Prosector to the Zoological Society of London, in the proceedings of that Society 1865, pag. 206, and with the inscription: "On the Anatomy of a Fin-Whale (Physalus antiquorum, Gray) captured near Gravesend."

ERRATA.

Side	10,	8th	row from	beneath	read	fins (pectoral)	instead of	fin.
„	14,	14th	„	—	„	„ in	„	i.
„	19,	4th	„	—	„	„ Balaenop	„	Baleonop.

EXPLANATION OF THE PLATES.

Plates I—VIII: ESCHRICHTIUS ROBUSTUS.

Plate I.

Fig. 1. Left lover jaw-bone, the inner side.
„ 2. d:o d:o d:o, the upper side.
„ 3. Right d:o d:o, the inner side, reverted.
„ 4. d:o d:o d:o, the upper side.
„ 5. Cornu anterius (stylo-hyal). *a*, the inner and *b* the outer end. *c*, the front and *d* the back side.
„ 6. Atlas, the front side. *a*, hypapophysis.
„ 7. d:o, the back side. *a*, hypapophysis.

Plate II.

„ 8. 3rd cervical vertebra, the back side.
„ 9. 6th d:o d:o, d:o d:o.
„ 10. 1st dorsal vertebra, the front side.
„ 11. d:o d:o d:o, the right side.
„ 12. 3rd d:o d:o, the back side.
„ 13. d:o d:o d:o, the right side.
„ 14. 6th d:o d:o, the front side.
„ 15. d:o d:o d:o, the right side.

Plate III.

„ 16. 13th dorsal vertebra, the front side.
„ 17. d:o d:o d:o, the right side. *a*, articular surface for costa.
„ 18. 1st lumbosacral vertebra, the front side.
„ 19. d:o d:o d:o, the right side.
„ 20. d:o d:o d:o, the lower side.

Fig. 21. 3rd lumbosacral vertebra, the right side.
„ 22. d:o d:o d:o, the lower side.
„ 23. d:o d:o d:o, corpus, the front end.

Plate IV.

Fig. 24. 6th lumbosacral vertebra, the right side.
„ 25. d:o d:o d:o, the lower side.
„ 26. d:o d:o d:o, corpus, the front end.
„ 27. 10th d:o d:o, the right side.
„ 28. d:o d:o d:o, the lower side.
„ 29. d:o d:o d:o, corpus, the front end.
„ 30. 1st caudal vertebra, the right side.
„ 31. d:o d:o d:o, the lower side. *a*, articular surfaces for the 1st haemapophyses.
„ 32. d:o caudal vertebra, corpus, the front end.

Plate V.

Fig. 33. 2nd caudal vertebra, the right side. *a*, compressed process at the hinder right articular surface for the processus spinosus inferior or the right haemapophysis.
„ 34. 2nd caudal vertebra, the lower side. *a*, the mentioned compressed process.
„ 35. 2nd caudal vertebra, corpus, the front end.
„ 36. 4th d:o d:o, the left side.
„ 37. d:o d:o d:o, the lower side.
„ 38. d:o d:o d:o, the front side, obliquely viewed.
„ 39. 6th d:o d o, the right side.
„ 40. d:o d:o d:o, the lower side of the right lateral part.
„ 41. d:o d:o d:o, the front side, obliquely viewed.
„ 42. 9th d:o d.o, the right side.

Plate VI.

Fig. 43. 11th—17th, 19th and 20th caudal vertebrae, the right side.
Figg. 44, 45 and 46, processus spinosi inferiores.
Fig. 47. 2nd rib, the left.
„ 48. d:o d:o, upper end of the right.
„ 49. 3rd d:o, lower end of the left.

Fig. 50. 4th rib, the left.
„ 51. 6th d:o d:o.
„ 52. 7th d:o d:o.
„ 53. 8th d:o d:o.
„ 54. 9th d:o d:o.

Plate VII.

Fig. 55. 10th rib, the right.
„ 56. 12th d:o, d:o.
„ 57. 13th d:o, d:o.
„ 58. 14th d:o, d:o.
„ 59. 15th d:o, the left.
„ 60. Breast-bone (sternum), the lower side.
„ 65—70. Carpal bones.
„ 71—74. Metacarpal bones.
„ 75—77. Phalanges.

Plate VIII.

Fig. 61. Right bladebone (scapula), the outer side.
„ 62. d:o d:o, viewed from the lower side.
„ 63. Left humerus, the outer side.
„ 64. Right ossa antibrachii (radius and ulna), the outer side.

Plates IX—XI: HUNTERIUS SVEDENBORGII.

Plate IX.

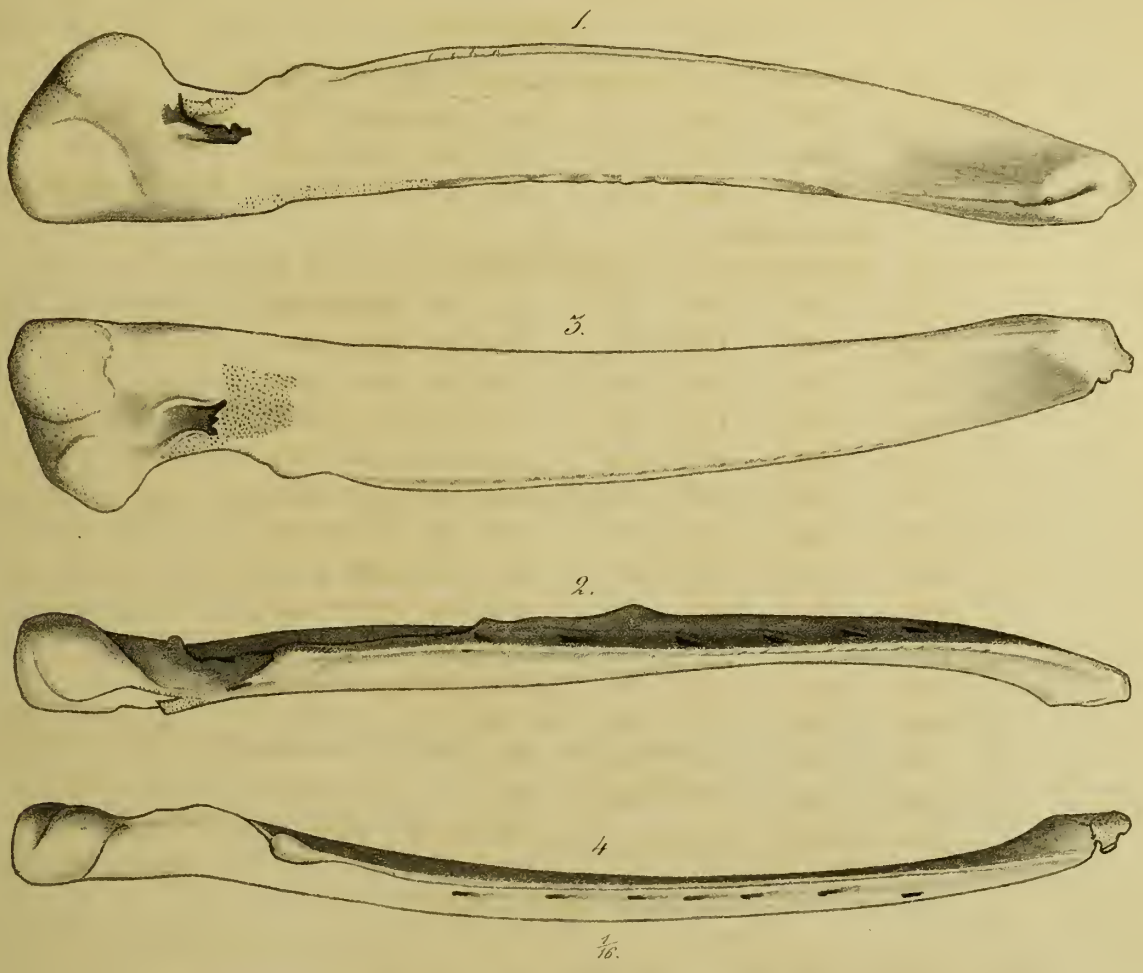
Fig. 78. Probably 2nd caudal vertebra, the right side.
„ 79. d:o d:o d:o d:o, the upper side.
„ 80. d:o d:o d:o d:o, the front side.
„ 81. d:o d:o d:o d:o, the left side.
„ 82. d:o 4th d:o d:o, the right side.
„ 83. d:o d:o d:o d:o, the upper side.
„ 84. d:o 6th d:o d:o, the right side.
„ 85. d:o d:o d:o d:o, the upper side.
„ 86. d:o 8th d:o d:o, the right side.
„ 87. d:o d:o d:o d:o, the upper side.
„ 88. d:o 9th d:o d:o, the right side.
„ 89. d:o d:o d:o d:o, the upper side.

Plate X.

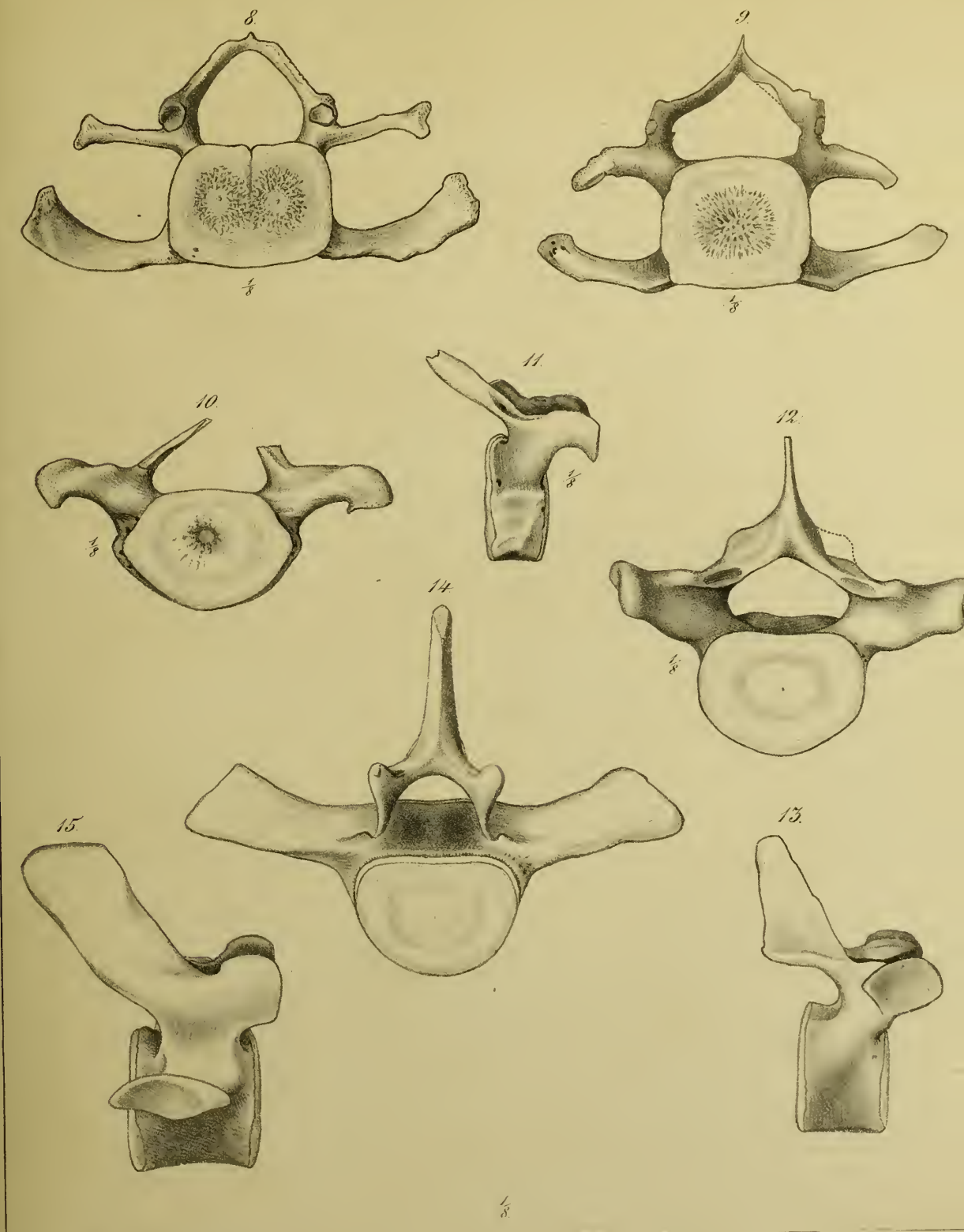
Fig. 90. Probably 10th caudal vertebra, the right side.
„ 91. d:o d:o d:o d:o, the upper side. Arcus failed.
„ 92. d:o d:o d:o d:o, the front side.
„ 93. d:o d:o d:o d:o, viewed obliquely from the front and lower sides.
„ 94. Probably 11th caudal vertebra, the right side.
„ 95. d:o d:o d:o d:o, the upper side.
„ 96. d:o 12th d:o d:o, the right side.
„ 97. d:o d:o d:o d:o, the upper side.
„ 98. d:o 13th d:o d:o, the right side.
„ 99. d:o d:o d:o d:o, the upper side.
„ 100. d:o 15th d:o d:o, the right side.
„ 101. d:o d:o d:o d:o, the upper side.
„ 102. d:o 16th d:o d:o, the right side.
„ 103. d:o d:o d:o d:o, the upper side.
„ 104. d:o 17th d:o d:o, the right side.
„ 105. d:o d:o d:o d:o, the upper side.
„ 107. d:o 3rd rib, the right.
„ 108. d:o 4th d:o, d:o.
„ 109. d:o 5th d:o, d:o.
„ 110. Section at the lower end of the 5th rib.

Plate XI.

Fig. 106. Breast-bone (sternum), the lower side.
„ 111. Probably 5th rib, viewed obliquely from behind.
„ 112. Bladebone (scapula), the left, the outer side. *a*, an ascending rough surface for the fixing of the as yet cartilaginous processus coracoideus.
„ 113. D:o, the lover end. *a*, the mentioned rough surface. *b*, acromion.



Eschrichtius robustus



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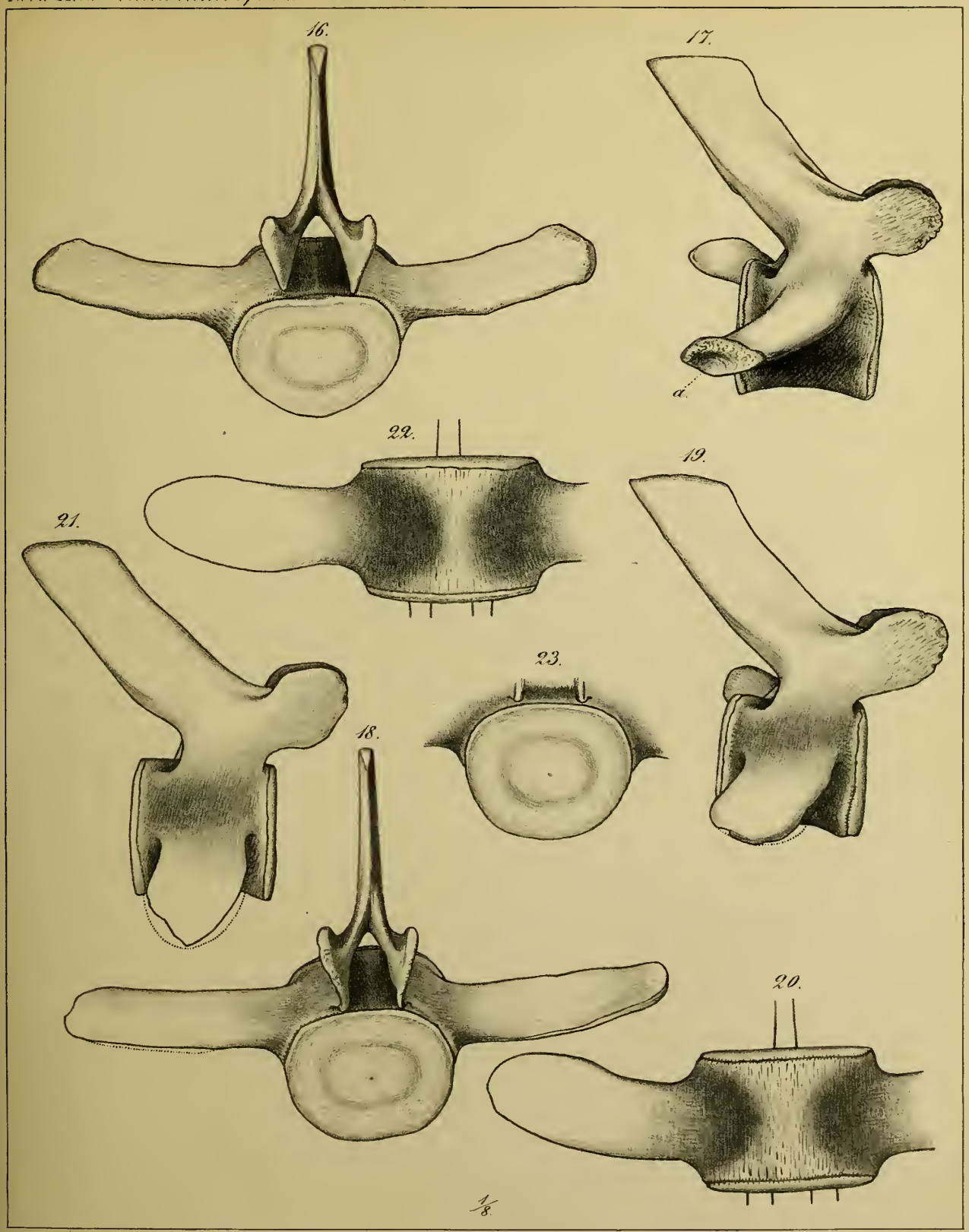

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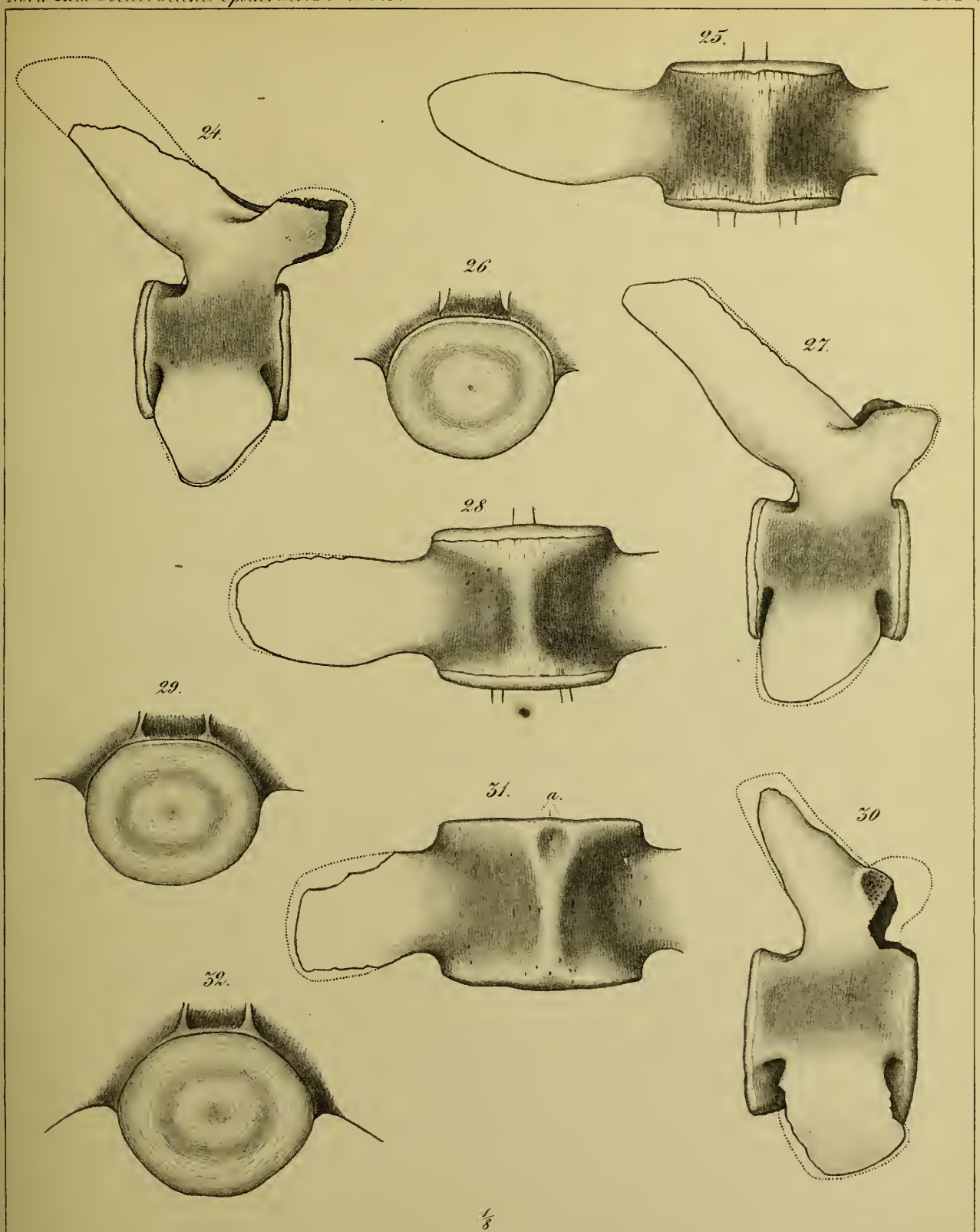
Eschrichtius robustus.



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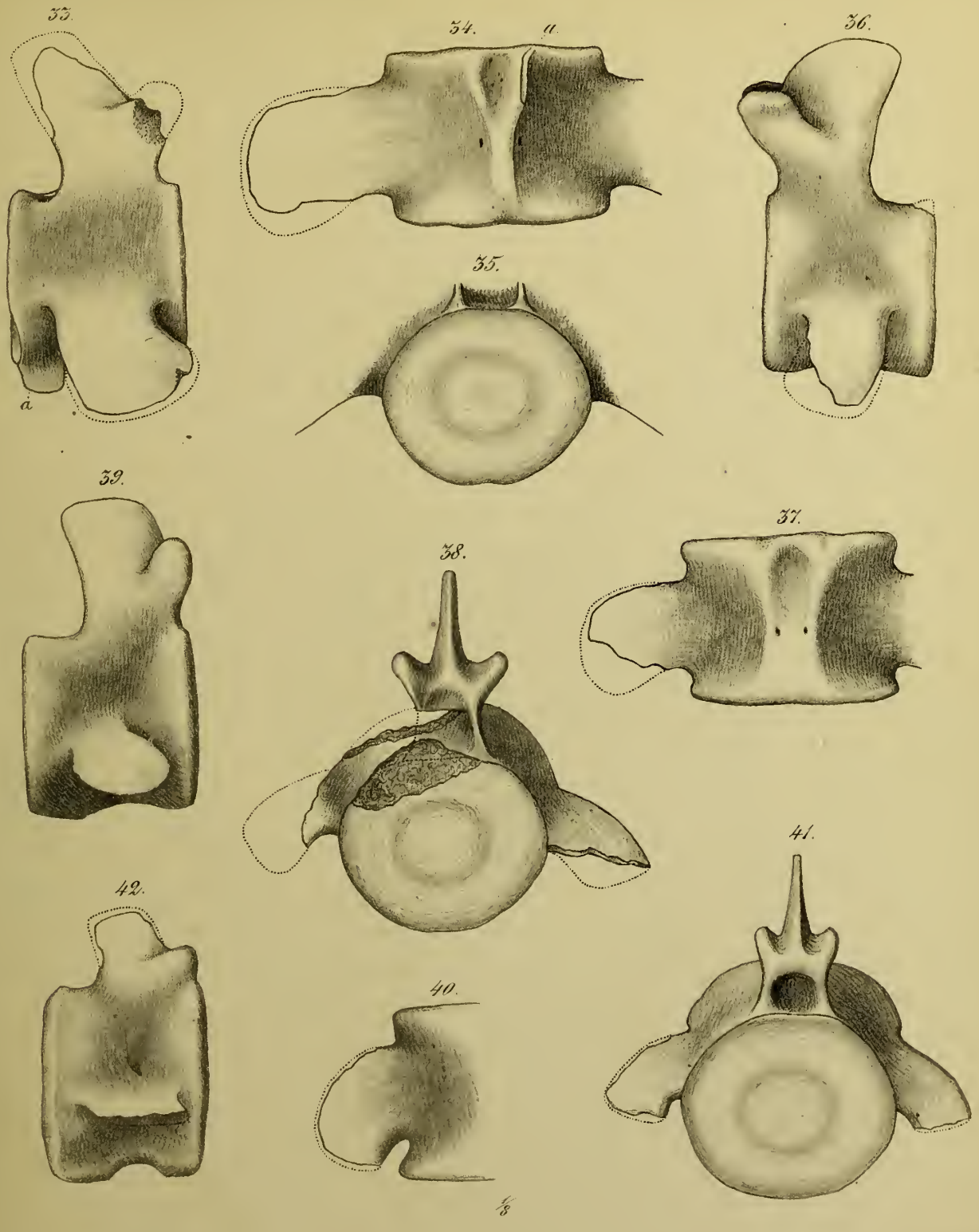
Eschrichtius robustus.



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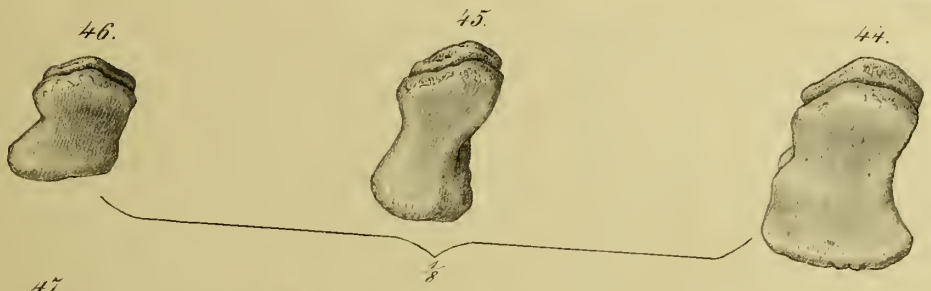
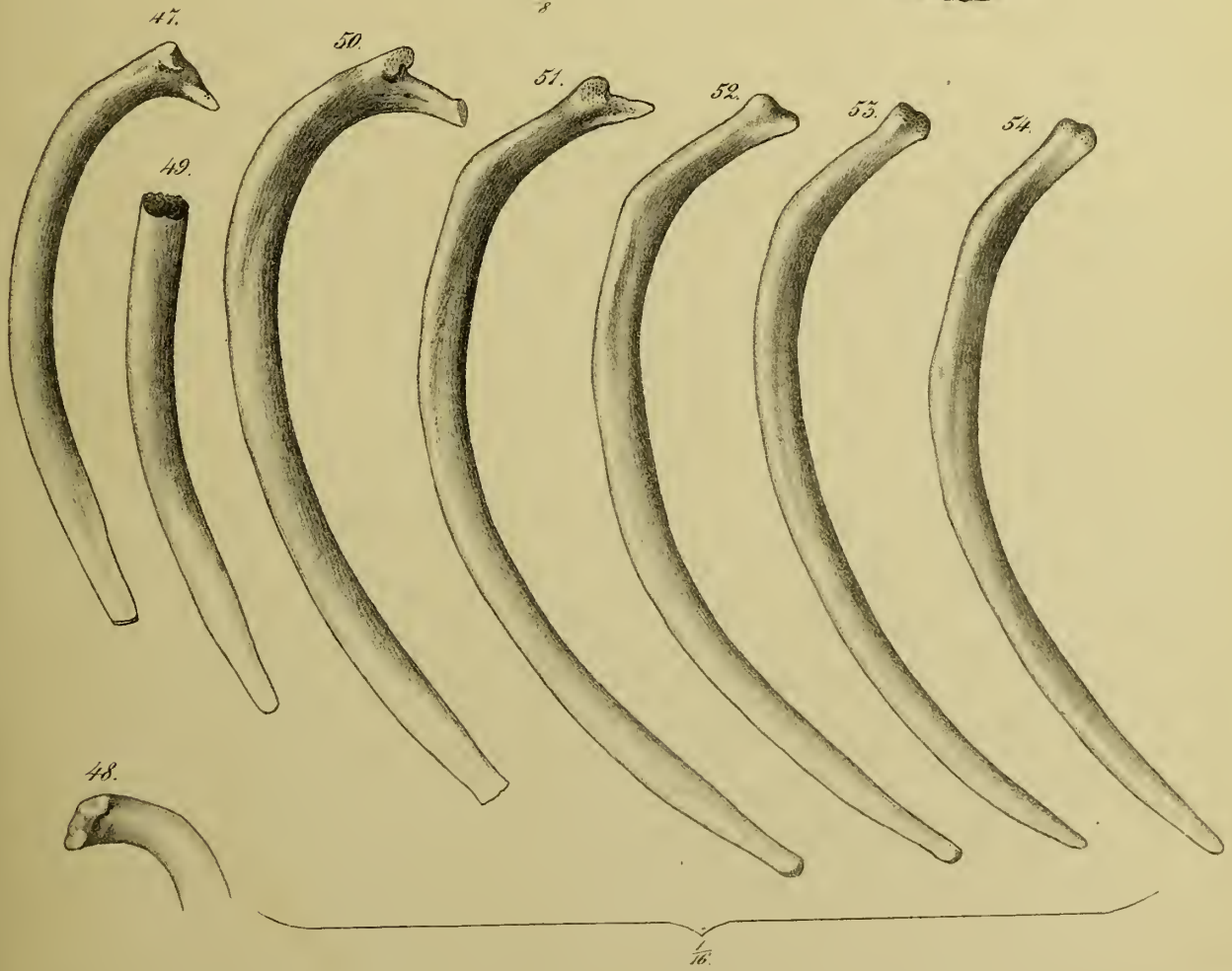
Eschrichtius robustus.





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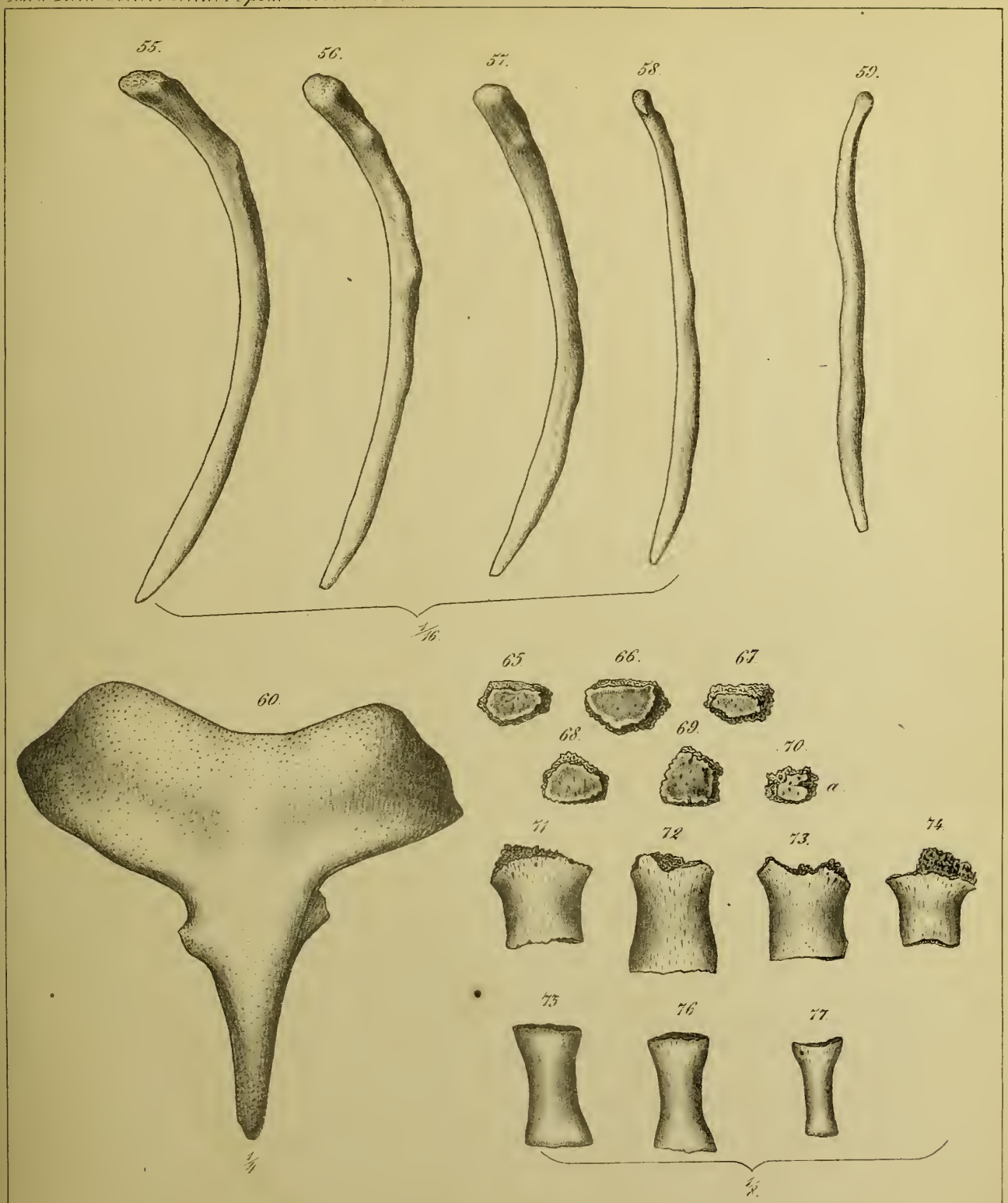
Eschrichtius robustus.



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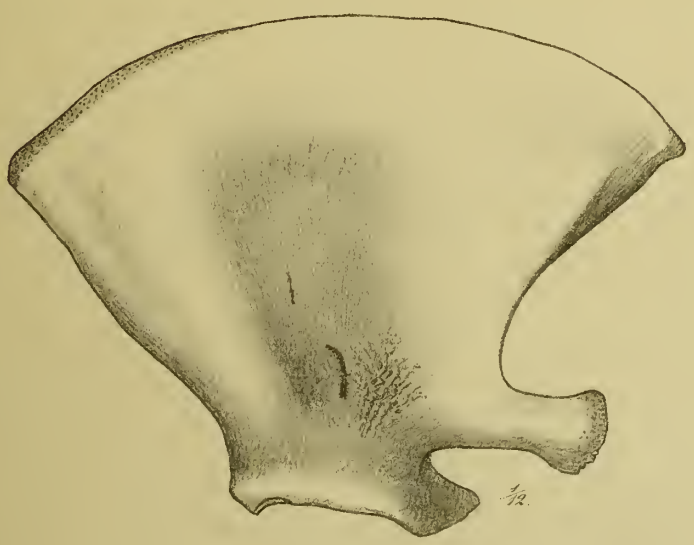
Eschrichtius robustus.

61.



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63.

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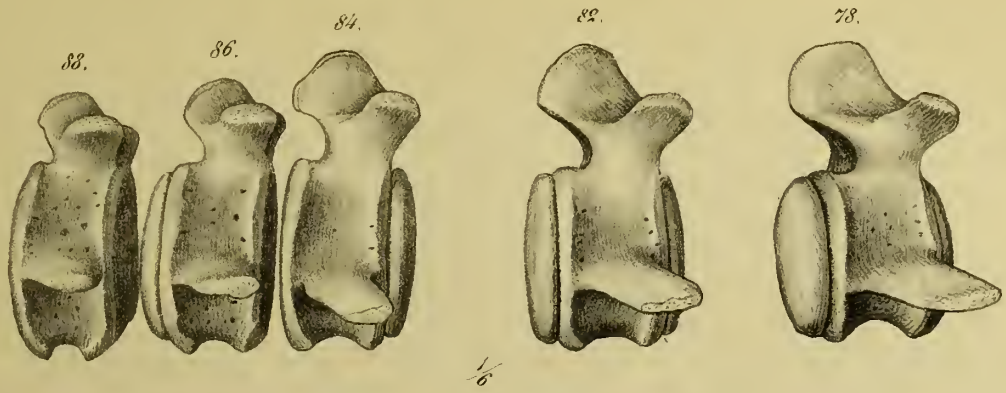
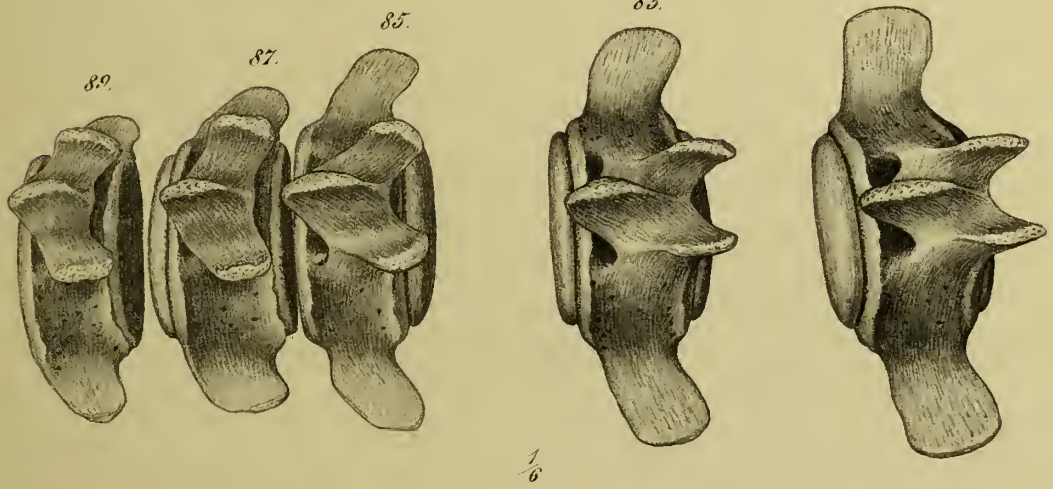
Ad nat. delin. C. F. L. Hedström.

Lith. o tr. h. C. G. Hoglina

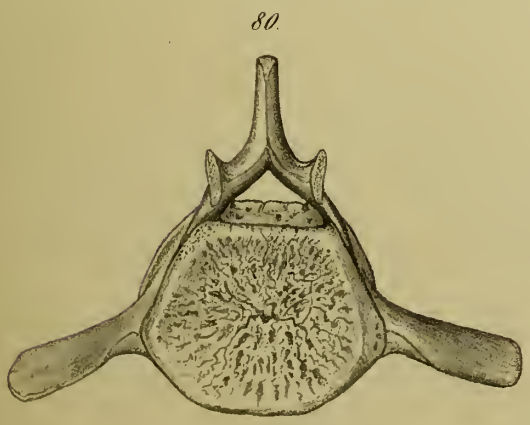
Eschrichtius robustus.

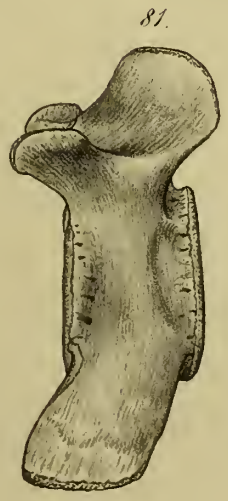


1/6



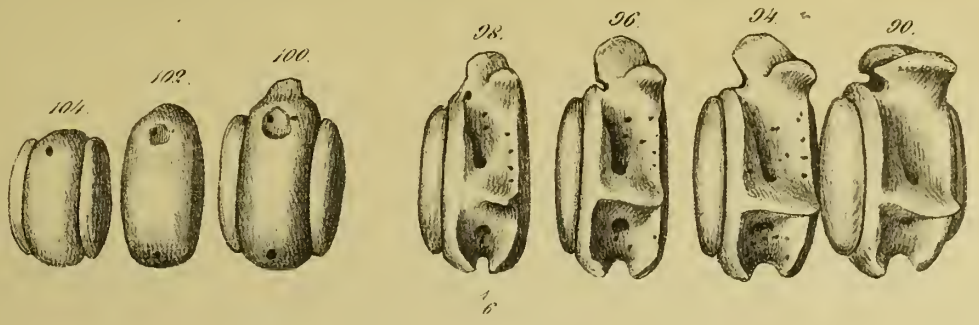
1/6

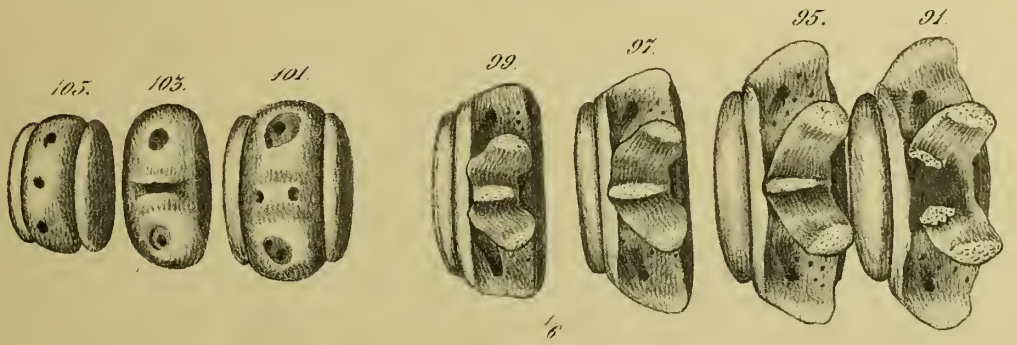


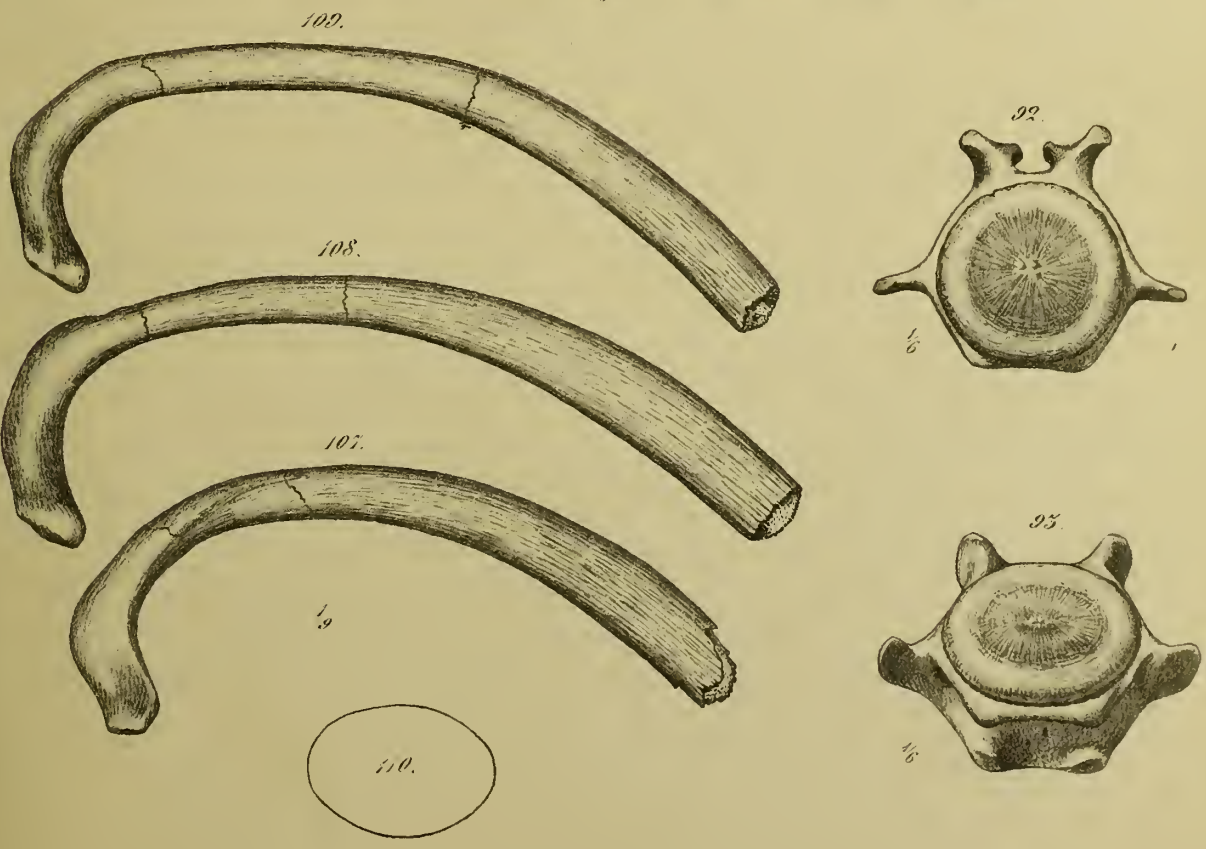


Lith. o. tr. m. C. F. Bäglund

Hunterius Svedenborgii.





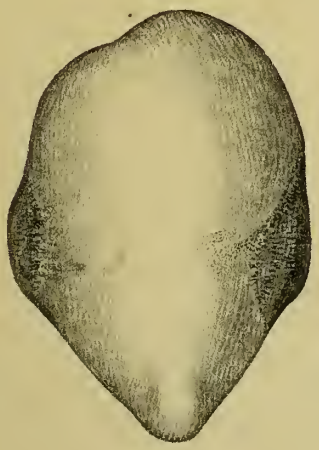


Journal. Gefin. D. F. L. Hedström.

Lith. o. tr. i G. Heglind

Hunterius Svedenborgii.

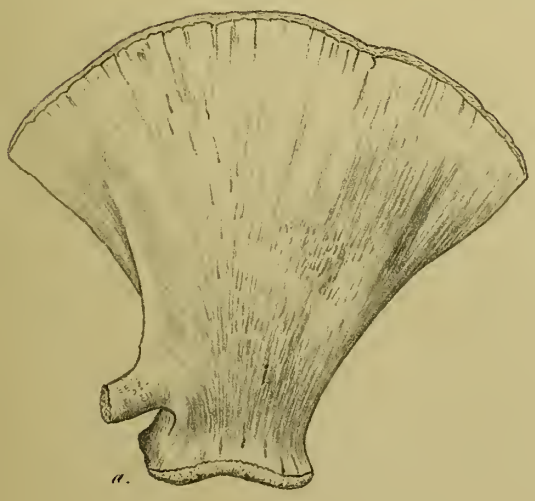
106.



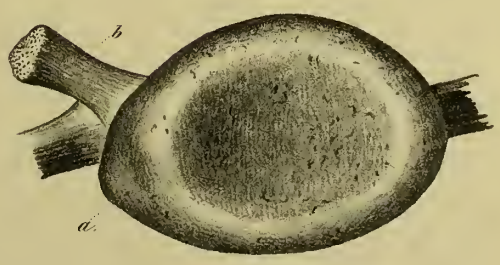
1/3

111.

112.



113.



Ad. nat. delin. C. F. L. Hedström figg. 106 & 113: Lilljeborg figg. 111 112.

Litho tr. h. C. G. Högblad

Hunterius Svedenborgii.